Accreditation Standards 2010
Diagnostic Imaging

Enhancing public safety through excellence in diagnostic medicine accreditation
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## GLOSSARY
Established in 1971, the Diagnostic Accreditation Program (DAP) has a mandate to assess the quality of diagnostic services in the province of British Columbia through accreditation activities. As a Program of the College of Physicians and Surgeons of British Columbia, the mandate and authority of the DAP is derived from the *Health Professions Act: Bylaws of the College of Physicians and Surgeons Section B.*

The DAP is committed to promoting excellence in diagnostic health care through the following activities:

- Establishing performance standards that are consistent with professional knowledge to ensure the delivery of safe, high quality diagnostic service;
- Evaluating a diagnostic service’s level of actual performance to achieving the performance standards;
- Establishing a comparative database of health care organizations, and their performance to selected structure, process, and outcome standards or criteria;
- Monitoring the performance of organizations through the establishment of external proficiency testing programs and other robust quality indicators of performance;
- Providing education and consultation to health care organizations, managers, and health professionals on quality improvement strategies and "best practices" in diagnostic health care;
- Ensuring information learned from accreditation processes is used for system wide improvement;
- Reporting to government, stakeholders and the public on the performance of the diagnostic health care system as assessed through accreditation;
- Strengthening the public's confidence in the quality of diagnostic health care;
- Assisting organizations to reduce risks and increase safety for patients and staff;
- Assisting organizations to reduce health care costs by promoting quality practices that increase efficiency and effectiveness of services; and
- Serving and safeguarding the public.
The Diagnostic Accreditation Program currently has twenty-three (23) accreditation programs covering the following diagnostic services:

**Diagnostic Imaging**
- Diagnostic Radiology
- Diagnostic Mammography
- Diagnostic Ultrasound
- Diagnostic Echocardiography
- Diagnostic Computed Tomography
- Diagnostic Magnetic Resonance Imaging
- Diagnostic Nuclear Medicine
- Diagnostic Bone Densitometry

**Laboratory Medicine**
- Sample Collection, Transport, Accessioning and Storage
- Hematology
- Chemistry
- Transfusion Medicine
- Microbiology
- Anatomic Pathology
- Point of Care Testing
- Cytology
- Cytogenetics

**Neurodiagnostic Services**
- Electroencephalography
- Evoked Potentials
- Electromyography & Nerve Conduction Studies

**Pulmonary Function**
- Hospital Based Services
- Community Based Services

**Polysomnography**

**Services and Core Functions**

The DAP operates on a continuous quality improvement model, and remains highly committed to supportive approaches to accreditation that foster the development of CQI cultures within the diagnostic services.

**Core Functions**

Establishing accreditation programs targeted at specific diagnostic services:
- Establishing optimal goals, standards, criteria and requirements

Establishing programs for assessor training and development:
- Selecting skilled and appropriate assessors
- Providing orientation and training to assessors
- Evaluating and developing assessor performance
- Ensuring inter-rater reliability of assessors
Establishing processes of accreditation:
- Establishing assessment activities required for accreditation
- Setting the criteria for awarding levels of accreditation
- Timely determination of accreditation decisions
- Establishing the duration and maintenance of accreditation
- Establishing a process for appeal of accreditation decisions
- Reporting accreditation status of organizations to the public

Establishing research and development, and education programs:
- Generating and transferring new knowledge gained through the accreditation process
- Evaluating existing accreditation programs for relevancy and effectiveness
- Identifying the need and requirement for new accreditation programs, standards and/or criteria
- Collecting, analyzing, comparing, and publishing data
- Providing feedback on the performance of diagnostic services
- Acting as a resource centre for quality improvement standards, methods and experience, and as a focal point for the collection of local information, as well as for comparisons with other provinces and countries.

Monitoring performance of organizations:
- Selecting and mandating external proficiency testing programs;
- Establishing new external proficiency testing programs or approaches to monitoring process performance when there is no existing program available;
- Developing and monitoring robust quality indicators of performance
What is Accreditation?

Accreditation is a process that assists diagnostic organizations/facilities/services evaluate and improve the quality of the services they provide to their patients and clients. It is a process that allows for the identification of improvement opportunities leading to an improved quality of service. Accreditation also provides recognition that the organization/facility/service is meeting provincial standards of quality.

The founding principle of the Diagnostic Accreditation Program’s model for accreditation is:

Enabling health care organizations to review and improve systems that support the delivery of safe, high quality diagnostic care

The Purpose of Accreditation

The purpose of accreditation is to provide the diagnostic service with a framework for continuous quality improvement:

- Provides the diagnostic service with an opportunity to effectively evaluate itself against provincially set standards.
- Provides an external objective assessment of performance and comparison with similar diagnostic services.
- Identifies significant risk management issues.
- Assists diagnostic services to focus on key improvement opportunities.
- Disseminates the most effective practices amongst organizations.
- Promotes communication, collaboration and team work throughout the diagnostic service.
Accreditation Assessment Activities

DAP accreditation involves continuous assessment activities that take place during a 4 year cycle. For new facilities and services, or services that have implemented a significant change, an Initial Assessment Process has been developed that requires completion of specific documentation and an initial on-site visit by the DAP prior to services being provided to patients. Previously accredited facilities and services participate continuously in assessment activities throughout the 4 year accreditation cycle.

New Facility or New Diagnostic Service Initial Assessment

- completion of documentation outlining facility service profile, equipment, individuals and related qualifications, etc.
- review of documentation and on-site visit by a DAP Accreditation Officer. In certain circumstances the Accreditation Officer may be accompanied by other external peer experts.
If the facility/service is granted a Provisional Accreditation award, they are permitted to commence service delivery to patients subject to satisfactory performance in fulfilling continuous accreditation requirements. If the facility/service is not granted Provisional Accreditation, they are not permitted to commence service delivery to patients.

**Self Assessment**

The Self Assessment is completed once in the 4 year cycle and precedes the On-site Assessment. Conducting a Self Assessment enables the diagnostic service to evaluate their performance relative to stated standards and best practice. Assessing the diagnostic service’s practices provides a profile of the strengths, risks, and opportunities for improvement. This is both a valuable process and tool to enable the management to focus continuous quality improvement efforts toward specific activities and take action with the creation of a quality improvement plan. The Self Assessment also prepares the diagnostic service for the On-site Assessment.

**On-site Assessment**

The On-site Assessment is completed once in the 4 year cycle and is conducted by DAP Accreditation Officers. During the On-site Assessment, the performance of the diagnostic service is assessed using patient and system tracers. This enables the Accreditation Officer(s) to assess the performance of the diagnostic service as staff is conducting patient examinations, studies and/or analysis. Detailed assessment protocols provide direction to the Accreditation Officer(s) outlining what to ask, observe, and assess. The use of protocols also assists with increasing the objectivity and consistency amongst Accreditation Officer(s). The tracer methodology has been used successfully by the The Joint Commission (formerly Joint Commission on Accreditation of Healthcare Organizations) and the DAP approach is based upon their experiences.

**Desk Top Audit and Self Audit Activities**

Throughout the four year cycle, facilities will continue to provide assessment activity submissions to the DAP for the continuous monitoring and surveillance of performance. Examples of these assessment activities include:

- internal audit submissions of high risk practices and clinical audits.
- conducting of audits using infection control tracers, patient safety tracers, and clinical informatics tracers.
- submission of performance indicator data.
- evidence of implementation of selected accreditation standards that are best assessed through desk top audit.

Should the DAP identify an area of concern, the diagnostic service may be subject to a mid-cycle on-site assessment by a DAP Accreditation Officer.
The Accreditation Award

The Diagnostic Accreditation Program of BC is the only regulatory body that can grant the accreditation award on behalf of its governing authority.

Accreditation awards possible are:

1. **Full accreditation** for a period of four years.

2. **Accreditation with report.** This award will be granted to an organization that delivers clinically safe and reliable services but has some anomalies to correct in its organization before it can be granted full accreditation status. The timeframe in which the report must be provided to the DAP will form part of the award requirements.

3. **Non-accreditation.** This status will be given to an organization that does not meet the basic requirement of a clinically safe and reliable service. Non-accreditation status means that no physician in BC may practice in, nor refer patients to, a non-accredited facility. Under current government policy, the Medical Services Plan will also withdraw billing approvals.

As a condition of accreditation, facilities must prominently display the original certificate of accreditation as issued by the DAP. This indicates to the public and patients attending the facility that clinically safe and reliable services are provided by the facility.
All accreditation programs of the Diagnostic Accreditation Program are based upon a quality framework and continuous quality improvement principles. For the purposes of its accreditation programs, the following definitions for quality and quality improvement have been adopted by the Diagnostic Accreditation Program.

**Quality**

The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.

**Quality Improvement**

A process that seeks to meet client’s needs and expectations by using a structured approach to selectively identify areas to improve, and that improves all aspects of the services, including outcomes of service to patients and clients.

**The Quality Framework**

The Diagnostic Accreditation Program has adopted a Quality Framework that consists of quality actions and quality categories. The quality actions are those activities related to the Shewart Cycle (Plan-Do-Check-Act) and to supporting processes of education and communication. The quality categories are groups of specific activities that define mandatory requirements and best practices. This framework is used as the basis for establishing standards and criteria that define the conditions for quality.

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1 Institute of Medicine
Quality Actions

The quality actions are based upon the Shewart cycle that provides an evidence-based approach to continuous improvement. The Shewart cycle is most commonly referred to as the Plan-Do-Check-Act (PDCA) cycle of activities. Augmenting this cycle are the activities of education and communication.

Plan
- Involves those activities related to assessing, identifying, analyzing, problem solving, prioritizing and defining.

Do
- Involves those activities related to implementation or putting into effect.

Check
- Involves those activities that evaluate, monitor, control or check.

Act
- Involves those activities related to taking corrective action when an unanticipated outcome becomes apparent through the “CHECK” activities.

Education
- Involves those activities related to providing and developing knowledge in others.

Communication
- Involves those activities related to imparting information and obtaining information from others.
Quality Categories
Defining Performance Excellence

Performance Excellence

Governance & Leadership

Medical Staff

Modality Specific*

Human Resources

Patient & Client Focus

Patient Safety

Quality Improvement

Radiation Safety

Equipment & Supplies

General Safety

Imaging Informatics

Nuclear Medicine

Information Management

Radiation Safety

Infection Prevention & Control

Magnetic Safety

* Modality Specific Accreditation Standards for Diagnostic Imaging

Global Modality
Radiology
Mammography
Ultrasound
Echocardiography
Computed Tomography
Computed Tomography
Magnetic Resonance Imaging
Nuclear Medicine
Bone Densitometry
Accreditation Standards

The foundation of the accreditation programs are the provincial standards and accompanying criteria and criterion descriptors set by the Diagnostic Accreditation Program. These are evidence based, outcome focused mandatory requirements and best practices that are aligned to the principles of quality. The standards, criteria and criterion descriptors are directive in nature yet allow the diagnostic service flexibility in how they approach and address each element. The accreditation standards are high level directive goal/outcome/deliverable statements that are to be reached. The accompanying criteria and criterion descriptors specify the activities that must be completed to support the standard being achieved.

Standards are:

- Outcome focused
- Directed at the operational level
- Goal statements of best practice
- Directive not prescriptive

Criteria and criterion descriptors:

- Specify activities to be completed
- Roll-up to standard attainment

The Diagnostic Accreditation Program’s accreditation standards are developed through a collaborative, consultative and consensus building process that involves health professionals and organizations, academics, experts, consumers, health authorities, colleges and the Ministry of Health Services. The process for standards development and review allows for considerable input from the diagnostic services that will be using the standards.

The DAP accreditation standards consist of three components:

1. **Standard** – a goal statement of achievable levels of performance. An accreditation standard is identified by a first level whole number ending in “.0” such as 1.0, 2.0, 3.0 etc.

2. **Criterion** – activities or components of the standards that once implemented lead to the overall attainment of the standard. A criterion is identified by the first level number indicating the standard that it is associated to, and a second level number such as X.1, X.2, X.3, etc.

3. **Criterion Descriptors** – specific actions for each criterion. Criterion descriptors are identified by the first level standards number, the second level criterion number and a third level criterion number such as X.Y.1, X.Y.2, etc. A criterion descriptor is either a mandatory requirement for accreditation, or a best practice. Mandatory criterion descriptors are indicated by a bold type face ‘M’.
**Quality Category Codes**

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance and Leadership</td>
<td>DGL</td>
</tr>
<tr>
<td>Medical Staff</td>
<td>DMS</td>
</tr>
<tr>
<td>Human Resources</td>
<td>DHR</td>
</tr>
<tr>
<td>Patient and Client Focus</td>
<td>DPC</td>
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<tr>
<td>General Safety</td>
<td>DSA</td>
</tr>
<tr>
<td>Radiation Safety</td>
<td>RS</td>
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<tr>
<td>Patient Safety</td>
<td>DPS</td>
</tr>
<tr>
<td>Infection Prevention and Control</td>
<td>DIPC</td>
</tr>
<tr>
<td>Quality Improvement</td>
<td>DQI</td>
</tr>
<tr>
<td>Information Management</td>
<td>DIM</td>
</tr>
<tr>
<td>Imaging Informatics</td>
<td>II</td>
</tr>
<tr>
<td>Equipment and Supplies</td>
<td>DES</td>
</tr>
<tr>
<td>Global Modality</td>
<td>GM</td>
</tr>
<tr>
<td>Intervventional Procedures</td>
<td>IP</td>
</tr>
<tr>
<td>Radiology</td>
<td>RA</td>
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<tr>
<td>Mammography</td>
<td>MA</td>
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<tr>
<td>Digital Mammography</td>
<td>DM</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>US</td>
</tr>
<tr>
<td>Echocardiography</td>
<td>EC</td>
</tr>
<tr>
<td>Computed Tomography</td>
<td>CT</td>
</tr>
<tr>
<td>Magnetic Resonance Imaging</td>
<td>MR</td>
</tr>
<tr>
<td>Magnetic Safety</td>
<td>MRS</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
<td>NM</td>
</tr>
<tr>
<td>Nuclear Medicine Radiation Safety</td>
<td>NMRS</td>
</tr>
<tr>
<td>Bone Densitometry</td>
<td>BD</td>
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</tbody>
</table>

Some standards may be assigned multiple codes to further identify the quality categories associated. As an example, the code RAES indicates that the standard is associated with Radiology (RA) and Equipment and Supplies (ES); DMII indicates the standard is associated with Digital Mammography and Imaging Informatics.
Example of an Accreditation Standard

DGL 1.0
The governing body/ownership is committed to, and actively engaged in, quality and safety.

DGL 1.1
The governing body/ownership is accountable for the quality and safety of care delivered by the imaging service. The governing body/ownership:

DGL1.1.1
ensures effective internal structures and resources are in place to support quality and safety within the imaging service.

Mandatory requirement for accreditation.

The criterion is written as an activity or component of the standard that once implemented will lead to the overall attainment of the standard.

The descriptor is written as a specific action associated with the criterion.
Conducting a Self Assessment enables the diagnostic service to take a snapshot of how they currently measure-up relative to stated accreditation standards. Assessing the diagnostic service’s practices provides a profile of the strengths, risks and opportunities for improvement. This is both a valuable process and tool to enable the management to focus continuous quality improvement efforts toward specific activities and take action with the creation of a quality improvement plan.

**Self Assessment**

During the Self Assessment process, the diagnostic service assesses itself relative to stated standards, criteria and criterion descriptors by using a rating scale. Ideally, the individuals who are involved in this process are those who are able to comment on practices that happen on a day-to-day basis and those who have operational responsibility. In most diagnostic services, this process will involve: directors, managers, department heads, chief technologists, supervisors, technologists, and physicians. The Self Assessment may be completed by a team, or by an individual who consults or meets with others. It is at the discretion of the diagnostic service to determine who will be involved in conducting the Self Assessment and completing the Self Assessment documentation.
The Rating Scale

A rating scale has been developed to allow diagnostic services to assess how well accreditation criteria are fulfilled. The scale points represent five performance categories and a “not applicable” option. The following rating scale guide allows for performance to be assessed relative to the accreditation criteria.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Exceptional Performance</td>
<td>All criterion descriptors have been fulfilled AND There is/are: Awareness by all relevant staff Processes to ensure intended outcomes are achieved [checking/evaluating/auditing/monitoring] Corrective actions undertaken as needed Continuous improvement efforts Evidence* to support the above</td>
</tr>
<tr>
<td>4</td>
<td>All criterion descriptors have been fulfilled</td>
<td>There is evidence* to support the above</td>
</tr>
<tr>
<td>3</td>
<td>Partial or full implementation of criterion descriptors</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>There is</td>
<td>Recognition of need to implement criterion Engagement in planning activities to address criterion OR Partial or full implementation, with concerns identified by assessor Examples a) issues related to safety b) less than desirable results may be achieved c) staff are not aware of critical practices and procedures</td>
</tr>
<tr>
<td>1</td>
<td>Criterion applicable but no action undertaken</td>
<td></td>
</tr>
</tbody>
</table>

*Evidence may take many possible forms
**On-site Assessment**

The on-site assessment is conducted by DAP Accreditation Officer(s). During the on-site assessment, the performance of the diagnostic service relative to each standard and criteria will be assessed. Collection of assessment data will be through discussions with the diagnostic service management and staff, reviewing documentation and observing the diagnostic processes. The on-site assessment also permits the exchange of knowledge and best practices between the diagnostic service and the DAP Accreditation Officer(s).

DAP Accreditation Officer(s) follow specific assessment protocols that directs their assessment activities and allows for comments, observations and recommendations to be recorded. DAP Accreditation Officer(s) assess and use the same rating scale as the diagnostic service to determine how well accreditation criteria have been fulfilled.
ACCREDITATION STANDARDS 2010

GOVERNANCE AND LEADERSHIP

Introduction:
Within each organization there exists a corporate governance structure that is ultimately responsible for the quality and safety of services provided. This responsibility is derived from its legal responsibility and operational authority for all activities undertaken by the organization. For large organizations, such as health authorities and some privately owned facilities, this governance structure is the Board of Directors. For other privately owned facilities the governance structure may be a partnership group or individual as the sole proprietor. For the purposes of these accreditation standards, the term “governing body/ownership” will be used to refer to those individuals who provide corporate governance to the organization.

Each organization, regardless of its complexity, also has a leadership structure. Many leadership responsibilities directly affect the provision of imaging services as well as the day to day operations of the diagnostic imaging department. In some cases, these responsibilities will be shared amongst leaders; in other cases, a particular leader may have primary responsibility. Regardless of the organization’s structure, it is important that leaders carry out all of their responsibilities.

The Governance and Leadership section of the accreditation standards addresses:
- Governance accountabilities
- Leadership of the imaging service’s day to day operations
- The importance of communication amongst leaders to improve quality and safety
- Diagnostic service planning
- Values and ethics

GOVERNANCE

DGL 1.0 The governing body/ownership is committed to, and actively engaged in, quality and safety.

Intent: For a culture of quality and safety to exist within the organization, the governing body/ownership must demonstrate a commitment to safety and quality and set expectations of management and senior leaders to create and maintain a safety and quality focused culture.
DGL 1.1 The governing body/ownership is accountable for the quality and safety of care delivered by the imaging service. The governing body/ownership:

DGL1.1.1 M ensures effective internal structures and resources are in place to support quality and safety within the imaging service.

DGL1.1.2 M appoints appropriately credentialed physicians to its imaging service medical staff.

DGL1.1.3 M ensures a quality and safety focused culture exists within the imaging service.

DGL1.1.4 M ensures that there is a quality and safety plan and system in place supported by an enabling culture.

DGL 1.2 The governing body/ownership receives reports on the quality and safety of care delivered by the imaging service. Written reports are received at least once per year on the following:

DGL1.2.1 all processes or system failures.

DGL1.2.2 M number and type of critical incidents.

DGL1.2.3 information disclosed to patients regarding critical incidents.

DGL1.2.4 M actions taken to proactively improve the quality and safety of services.

DGL1.2.5 results from proactive risk assessments of high risk processes.

DGL1.2.6 M reported quality and safety issues.

DGL1.2.7 M results from an assessment of the quality and safety culture.

DGL1.2.8 M quality and safety related performance indicators.

DGL1.2.9 M results from medical peer review activities.

DGL1.2.10 M quality and safety plan, system and culture

LEADERSHIP

DGL 2.0 Accountability and responsibility for key leadership functions is assigned.

Guidance: Functions may be assigned to an individual, leadership group or committee. An individual may be assigned to more than one key function.

DGL 2.1 Accountability is assigned for:

DGL2.1.1 M defining scope of service.

DGL2.1.2 M budget development.

DGL2.1.3 M monitoring resource use.

DGL2.1.4 M medical staff.

DGL2.1.5 M human resources.

DGL2.1.6 M staff safety.

DGL2.1.7 M infection prevention and control.

DGL2.1.8 M patient safety.

DGL2.1.9 M radiation safety.

DGL2.1.10 M disaster planning.

DGL2.1.11 M information management.

DGL2.1.12 M satisfaction/complaints management.

DGL2.1.13 M equipment and supplies.

DGL2.1.14 M quality improvement.

DGL2.1.15 M technical operations.
Responsibility for the clinical oversight of imaging service quality and safety is assigned and supported by the organization.

Guidance: Clinical oversight describes a system through which an organization continually improves the quality of their services and safeguards high standards of care by creating an environment that promotes clinical excellence. Through the clinical oversight system appropriate oversight of clinical safety and quality occurs. Mechanisms for clinical oversight may vary depending on the complexity of the organization and whether it is a health authority facility or privately owned. As an example, for more complex facilities, clinical oversight will generally include the medical leader reporting to a senior medical corporate officer and CEO who will in turn report to the Board, with appropriate input received from a medical advisory committee and/or an organization-wide quality council at the Board level. For privately owned facilities, the medical leader may report to the ownership. The activities associated with the clinical oversight system are identified in the Quality Improvement Standards DQI 1.0 – DQI 7.0. An individual may be appointed to more than one leadership role.

A senior medical leader* is appointed with responsibility for the quality and safety of medical practice within the imaging service.

Medical leaders are appointed for specific sections/departments/ programs within the imaging service with responsibility for the quality and safety of medical practice within the section/department/ program.

Medical leaders are actively involved in the reporting of the clinical caseload to ensure quality.

There is a defined structure and processes through which the senior medical leader and other appointed medical leaders are held accountable.

Administrative leadership is appointed with responsibility for the quality and safety of operational processes of the imaging service.

Technical leader(s) are appointed with responsibility for the quality and safety of the technical operations.

Medical, administrative and technical leaders work collaboratively to provide effective oversight of imaging service quality and safety.

Roles and responsibilities for oversight of imaging service quality and safety are contained within each leader’s position/job description.

The organization provides leaders with the necessary training and support to effectively conduct oversight of imaging service quality and safety.

There is a documented and dated organizational structure that identifies:

- the management structure of the imaging service.
- lines of accountability.
- responsibility, authority and interrelationships of all staff.
- relationship to any other organization that the imaging service is associated with (e.g. medical leadership located remotely, tele-imaging, etc.).

* The senior medical leader is referred to as a medical director in Section B 5-26 of the Health Professions Act: Bylaws of the College of Physicians and Surgeons.
DGL 3.0 The assigned leaders of the imaging service communicate effectively with each other on issues of quality and safety.

**Intent:** To meet their obligations effectively, leaders must collaborate. In smaller organizations this may mean that a single leader or small group of leaders works closely with staff in order to meet the imaging service’s needs. In this case key staff members share decision making in order to direct the day to day operations, assess needs, secure resources and plan for the future. Communication amongst leaders is important to effective imaging service performance. Leaders with different responsibilities - administration and the clinical staff - bring different skills, experiences and perspectives to the imaging service. Working together means that leaders have the opportunity to participate in discussions and have their opinions heard.

DGL 3.1 Leaders discuss issues that affect the imaging service, including:

- DGL3.1.1 reported safety and quality issues.
- DGL3.1.2 proposed solutions and their impact on the imaging service’s resources.
- DGL3.1.3 feedback from patients and referring practitioners.
- DGL3.1.4 quality improvement activities.
- DGL3.1.5 reports on key performance indicators.

**SERVICE PLANNING**

DGL 4.0 The imaging service plans services to meet the current and future needs of the patient population it serves.

DGL 4.1 The imaging service provides services that are in alignment with the mission, vision and strategic direction of the organization.

**Intent:** The governing body/ownership establishes the direction and unity of purpose for the organization as a whole. The imaging service must provide a scope of service that is in alignment with the mission and strategic direction of the organization.

- DGL4.1.1 The mission, vision, and strategic direction for the organization have been communicated to the imaging service leadership.

DGL 4.2 The imaging service determines the scope of services using a planning process that considers:

- DGL4.2.1 the organization’s mission, vision and strategic plan.
- DGL4.2.2 requirements of the patient population serviced.
- DGL4.2.3 requirements of referring health care professionals.
- DGL4.2.4 existing capacity of the imaging service.
- DGL4.2.5 other services provided in the geographic area.
- DGL4.2.6 clinical value of the examinations/procedures.
- DGL4.2.7 capital, technology and operational requirements to implement.
DGL 4.3  The imaging service has a defined scope of service.
DGL4.3.1  The scope of service that the imaging service intends to provide is documented.
DGL4.3.2  The scope of service has been communicated to referring practitioners.

DGL 4.4  An annual operating budget is developed.
DGL4.4.1  The operating budget identifies resources required to deliver the scope of service.
DGL4.4.2  The operating budget is developed with input from key leaders.
DGL4.4.3  Actual expenditures in comparison to budget are monitored monthly.

DGL 4.5  A capital equipment budget is developed.
DGL4.5.1  New capital equipment required to deliver the scope of service is identified.
DGL4.5.2  The capital equipment budget is developed with input from key leaders.

VALUES & ETHICS

DGL 5.0  The imaging service delivers services and makes decisions in accordance with its values and ethical principles.

DGL 5.1  The values of the organization have been communicated to staff.

DGL 5.2  The imaging service promotes an environment that fosters and requires ethical and legal behaviour.
DGL5.2.1  There is a written code of ethics for professional behaviour.
DGL5.2.2  There is a process for investigating and addressing unethical or illegal behaviour.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:

Diagnostic Accreditation Program Accreditation Standards 2005. British Columbia, Canada

Diagnostic Accreditation Program Accreditation Standards 2007. British Columbia, Canada

Joint Commission 2009 Hospital Accreditation Standards. Illinois, USA.

SPECIFIC DOCUMENTS REFERENCED

ACCREDITATION STANDARDS 2010

MEDICAL STAFF

Introduction:
The medical staff of the organization is comprised of those medical practitioners who hold a valid license to practice medicine in British Columbia, and who have been appointed to the medical staff by the governing body/ownership of the organization. The governing body/ownership has a responsibility to ensure that only qualified and competent medical practitioners are appointed to the medical staff. The medical staff is accountable to the governing body/ownership.

The Medical Staff section of the accreditation standards addresses:
- Medical staff leadership
- Medical staff credentialing and privileging
- Delegation of medical acts
- Continuing medical education
- Medical staff contracts

MEDICAL STAFF LEADERSHIP

Introduction:
For health authority/hospital based imaging services, the medical leader may have the title of Chief, Department Head, Medical Director, or an alternate title. The medical leader and medical staff of health authority/hospital based imaging services operate within the provisions set out in the Medical Staff Bylaws, and are accountable to the governing body through the established medical staff structure of the health authority/hospital.

In partnership groups, one or more partners may take responsibility for the activities of medical leadership and there may or may not exist written documents that outline the medical staff structure and rules for self governance.

If a physician is the owner in solo practice, they are responsible for ensuring the activities of medical leadership take place, inclusive of ensuring that they are qualified and competent themselves to undertake the scope of medical service provided within their organization through a peer review process.

See also Leadership & Management Accreditation Standards DGL 2.0 – DGL 3.0 and Quality Improvement Accreditation Standards DQI 4.7 – DQI 4.10.
DMS 1.0  A medical leader is appointed with assigned responsibilities and accountabilities for the imaging service.

DMS 1.1  The medical leader has responsibility for medically related activities that includes:

DMS1.1.1  continuous monitoring of the professional performance of medical staff practicing in the imaging service through a peer review process.

 Guidance:  See also Quality Improvement Accreditation Standards DQI 4.7 – DQI 4.10 regarding medical peer review.

DMS1.1.2  recommending to the governing body/ownership the privileges for each member of the medical staff in the imaging service

establishing for the imaging service:

DMS1.1.3  standardization of interpretive comments.
DMS1.1.4  report formats.
DMS1.1.5  quality and safety related performance indicators.

DMS1.1.6  making recommendation on the number of qualified competent medical staff necessary to ensure quality and safety of imaging service provision.
DMS1.1.7  establishing and monitoring policies and procedures for the delegation of medical acts.
DMS1.1.8  authorizing the implementation of technical/medical operational policies and procedures related to imaging.
DMS1.1.9  coordinating and integrating the imaging service with other departments and services.

 Intent:  If additional imaging or other testing is recommended for a patient, the facility should have the capacity to perform the recommended examinations/tests, or it should make arrangement with a cooperating facility where it can refer the patient for the performance of these examinations/tests.  The medical leader can facilitate this continuity of patient care by coordinating and integrating the imaging service with other departments, services and/or organizations.

DMS1.1.10  actively participating in quality oversight and improvement activities.

DMS 1.2  Medical leaders must attend the imaging service to assess the quality and safety of service.

At a minimum, for radiology:

DMS1.2.1  initially when medical leadership responsibility commences.
DMS1.2.2  thereafter once per year.

 Guidance:  The annual visit may be undertaken by a technical delegate deemed qualified by the medical leader unless delegated medical acts are performed on-site.

At a minimum, for mammography:

DMS1.2.3  initially when medical leadership responsibility commences.
DMS1.2.4  thereafter every six months.
At a minimum, for ultrasound:

DMS1.2.5 M ☐ initially when medical leadership responsibility commences.
DMS1.2.6 M ☐ thereafter every six months.

Guidance: The semi-annual visit may be undertaken by a sonographer delegate deemed qualified by the medical leader.

At a minimum, for echocardiography:

DMS1.2.7 M ☐ initially when medical leadership responsibility commences.
DMS1.2.8 M ☐ thereafter every six months.

At a minimum, for computed tomography:

DMS1.2.9 M ☐ initially when medical leadership responsibility commences.
DMS1.2.10 M ☐ thereafter four times per year.

Intent: Due to concerns with radiation safety, the medical leader's assessment occurs more frequently and is to include a review of the protocols and radiation dose for adult and pediatric patients.

At a minimum, for magnetic resonance imaging:

DMS1.2.11 M ☐ initially when medical leadership responsibility commences.
DMS1.2.12 M ☐ thereafter every six months.

At a minimum, for nuclear medicine:

DMS1.2.13 M ☐ initially when medical leadership responsibility commences.
DMS1.2.14 M ☐ thereafter every six months.

At a minimum, for bone densitometry:

DMS1.2.15 M ☐ initially when medical leadership responsibility commences.
DMS1.2.16 M ☐ thereafter once per year.

Guidance: The annual visit may be undertaken by a technical delegate deemed qualified by the medical leader.

DMS1.2.17 M ☐ The medical leader assesses the complexity of services provided and undertakes more frequent visits if warranted.

DMS 1.3 In attending the imaging service, the medical leader assesses the quality and safety of service by:

DMS1.3.1 M ☐ observing the performance of the imaging technologists performing the examination to ensure safe operating procedures are used.
DMS1.3.2 M ☐ reviewing all quality control documentation.
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DMS 1.4 Logs to record medical leader visits are maintained.

DMS1.4.1 M □ A log is kept to record the visit of the medical leader to the imaging service.
DMS1.4.2 M □ Recommendations for improvement or required follow-up are recorded in the log.
DMS1.4.3 M □ In the event that a delegate conducts the visit, the medical leader must receive a copy of the log, and any recommendations for improvement or required follow-up, within two weeks of the visits completion.
DMS1.4.4 M □ The log is signed by the person conducting the visit.

DMS 1.5 Roles of authority, responsibility and accountability are clearly defined and maintained at remotely supervised facilities.

DMS1.5.1 M □ The medical leader or designated interpreting physician maintains ongoing communication with the technical staff and examination requestors.
DMS1.5.2 M □ Processes are in place to ensure the prompt availability of the interpreting physician for consultation and image review, whenever required.
DMS1.5.3 M □ Emergencies are reviewed by the radiologist or designated interpreting physician prior to patient discharge.
DMS1.5.4 M □ The medical leader documents those examinations that may be performed at remotely supervised facilities.

**CREDENTIALING AND PRIVILEGING**

Introduction:
Credentialing and privileging are essential processes to ensure that qualified and competent medical practitioners are performing a designated scope of service/procedures within the imaging service. Credentialing is a process that involves the collection, verification and assessment of information regarding the licensure; education and training; and experience and ability of an individual physician to perform a requested privilege. Licensure, education and completion of training can be verified through federal and provincial regulatory Colleges of Physicians and Surgeons, academic institutions and residency programs. Experience, ability and current competency can be verified by medical peers who are knowledgeable of, or who have assessed, the physician’s professional performance.

For health authority/hospital based imaging services, the credentialing and privileging process is formalized and involves the imaging service medical leader, the medical administrative offices providing a supportive function, and the Board of Directors. The credentialing process results in a recommendation by the medical staff leadership to the governing body that certain privileges be granted to the individual medical practitioner.

For a privately owned facility, there may be a formal or informal process used for credentialing and defining scope of practice. Whether formal or informal, it is the expectation of these accreditation standards that the ownership or partnership group can demonstrate how they ensure only qualified and competent medical practitioners practice within their facility.
DMS 2.0  Appropriately qualified and competent medical practitioners practice within the imaging service.

DMS 2.1  There is a defined scope of practice/procedures list.

DMS 2.2  Information for each medical practitioner is collected, verified and assessed relative to the requested scope of practice/procedure. This information includes:

- M current licensure from the College of Physicians and Surgeons of British Columbia.
- M approval from the College of Physicians and Surgeons of British Columbia to perform restricted services.
  
  Guidance: See also DMS 2.3 – DMS 2.15

- M relevant education and training.
- M evidence of physical ability to perform the scope of practice/procedure.
- M experience and competency to perform the scope of practice/procedure.

DMS 2.3  Diagnostic radiology services are provided by physicians:

- M licensed to practice Diagnostic Radiology by the College of Physicians and Surgeons of British Columbia.

DMS 2.4  Diagnostic mammography services are provided by physicians:

- M licensed to practice Diagnostic Radiology by the College of Physicians and Surgeons of British Columbia.

DMS 2.5  Diagnostic ultrasound services are provided by physicians:

- M licensed to practice Diagnostic Radiology by the College of Physicians and Surgeons of British Columbia.

DMS 2.6  Limited scope ultrasound services, restricted to Obstetrical and Gynecological ultrasound, may be provided by physicians:

- M licensed to practice Obstetrics and Gynecology or Perinatology by the College of Physicians and Surgeons of British Columbia, and

- M approved to perform this restricted service by the College of Physicians and Surgeons of British Columbia.

DMS 2.7  Limited scope ultrasound services, restricted to vascular ultrasound, may be provided by physicians:

- M licensed to practice vascular surgery by the College of Physicians and Surgeons of British Columbia, and

- M approved to perform this restricted service by the College of Physicians and Surgeons of British Columbia.
Diagnostic echocardiography services are provided by physicians:

DMS 2.8

DMS2.8.1 M ☐ licensed to practice Diagnostic Radiology, Cardiology or Internal Medicine by the College of Physicians and Surgeons of British Columbia, and

DMS2.8.2 M ☐ approved to perform the restricted service of transthoracic echocardiography (TTE) by the College of Physicians and Surgeons of British Columbia, and

DMS2.8.3 M ☐ approved to perform the restricted service of transesophageal echocardiography (TEE) by the College of Physicians and Surgeons of British Columbia.

Diagnostic computed tomography (CT) services are provided by physicians:

DMS 2.9

DMS2.9.1 M ☐ licensed to practice Diagnostic Radiology by the College of Physicians and Surgeons of British Columbia.

Diagnostic magnetic resonance imaging (MRI) services are provided by physicians:

DMS 2.10

DMS2.10.1 M ☐ licensed to practice Diagnostic Radiology by the College of Physicians and Surgeons of British Columbia, and

DMS2.10.2 M ☐ approved to perform this restricted service by the College of Physicians and Surgeons of British Columbia.

Nuclear medicine services are provided by physicians:

DMS 2.11

DMS2.11.1 M ☐ licensed to practice Nuclear Medicine by the College of Physicians and Surgeons of British Columbia, and

DMS2.11.2 M ☐ are familiar with Computed Tomography anatomy where diagnostic services are performed using SPECT/CT hybrid systems.

Limited scope nuclear medicine services, restricted to nuclear cardiology, are provided by physicians:

DMS 2.12

DMS2.12.1 M ☐ licensed to practice Cardiology by the College of Physicians and Surgeons of British Columbia, and

DMS2.12.2 M ☐ approved to perform the restricted service of nuclear cardiology by the College of Physicians and Surgeons of British Columbia, and

DMS2.12.3 M ☐ are familiar with Computed Tomography anatomy where diagnostic services are performed using SPECT/CT hybrid systems.

Limited scope nuclear medicine services, restricted to second reader status, are provided by physicians:

DMS 2.13

DMS2.13.1 M ☐ licensed to practice Diagnostic Radiology by the College of Physicians and Surgeons of British Columbia, and

DMS2.13.2 M ☐ approved to perform limited scope nuclear medicine, restricted to second reader status, by the College of Physicians and Surgeons of British Columbia, and

DMS2.13.3 M ☐ are familiar with Computed Tomography anatomy where diagnostic services are performed using SPECT/CT hybrid systems.
DMS 2.14  Bone Densitometry services are provided by physicians:
DMS2.14.1  M ☐ licensed to practice Diagnostic Radiology or Nuclear Medicine by the College of Physicians and Surgeons of British Columbia.
DMS2.14.2  ☐ who have current certification from the International Society for Clinical Densitometry (ISCD).

DMS 2.15  Complex interventional procedures are provided by physicians:
DMS2.15.1  M ☐ licensed to practice medicine by the College of Physicians and Surgeons of British Columbia.
DMS2.15.2  M ☐ with training in complex interventional procedures acceptable to the medical leadership of the health authority.

DMS 2.16  Medical staff only practice within the scope of their privileges and capabilities.
DMS2.16.1  M ☐ A record is maintained for each medical practitioner indicating the scope of service/procedures they are permitted to practice within the imaging service.
DMS2.16.2  M ☐ The approved scope of service/procedure is communicated to each medical practitioner.
DMS2.16.3  M ☐ Medical practitioners inform the medical leader if they feel they have inadequate experience or any limitation in their ability or expertise with respect to performing a particular examination/test or in assessing any particular patient case.

DMS 3.0  Physicians who operate radiographic and/or radioscopic equipment have the necessary education, knowledge and skills to do so safely and effectively.²

Intent: To ensure patient and operator safety, it is essential that physicians who choose to operate radiographic and/or radioscopic equipment are appropriately trained on the use of the equipment, and are knowledgeable about the unique radiation safety issues associated with this equipment. As most radiologists receive training in radioscopy (fluoroscopy) during their residency training programs, radiologists are exempt from DMS 3.5 as it relates to radioscopy.

DMS 3.1  Operators of radiographic and/or radioscopic equipment have documented training in:
DMS3.1.1  M ☐ the safe operation of radiographic and/or radioscopic equipment and accessories being used in the facility.
DMS3.1.2  M ☐ all manufacturer-specified quality assurance procedures.
DMS3.1.3  M ☐ radiation protection procedures and measures.
  Guidance: Physicians performing fluoroscopy are encouraged to complete the OSHA Program.
DMS3.1.4  M ☐ techniques to optimize image quality.

  for radiography:
DMS3.1.5  M ☐ the radiological procedure being performed.
DMS3.1.6  M ☐ patient positioning for accurate localization of regions of interest.
### DMS 3.2
Operators of radiographic and/or radioscopic equipment have knowledge of radiation protection and safety that includes:

| DMS3.2.1 | M  □ radiation protection practices and the ALARA principle. |
| DMS3.2.2 | M  □ minimizing radiation exposures to patients, staff and visitors. |
| DMS3.2.3 | M  □ appropriate reduction of radiation exposures to lowest practical levels. |
| DMS3.2.4 | M  □ appropriate use of personal protective equipment. |
| DMS3.2.5 | M  □ understanding the requirements of Health Canada Safety Code 35. |

### DMS 3.3
Operators are familiar with, and have access to, the manufacturer’s operator manual for the specific equipment used in the facility.

### DMS 3.4
Operators participate fully in the established quality program for the facility, including reporting any change in equipment performance to the responsible user.

*Guidance: Health Canada defines the responsible user as the individual with responsibility to monitor and manage the radiation safety program of the facility including personnel requirements, equipment performance and safety procedures and to communicate program information with the appropriate staff. Operators should be aware of who the responsible user is for their facility.*

### DMS 3.5
Prior to commencing independent work on patients:

| DMS3.5.1 | M  □ the competency of the operator in DMS 3.1- 3.4 is assessed by a CAMRT certified medical radiation technologist. |
| DMS3.5.2 | M  □ a record of the assessment is maintained. |
| DMS3.5.3 |  □ operators are supervised as necessary. |
DELEGATED MEDICAL ACTS

Introduction:
The following has been reprinted from the College of Physicians and Surgeons of British Columbia Resource Manual dated September 2009 and can be accessed at https://www.cpsbc.ca/files/u6/Delegation-of-a-Medical-Act.pdf. This document is subject to change, and the reader is encouraged to consult the College’s website, or a Deputy Registrar, for the most up-to-date information.

The delegation of a medical act to persons other than physicians may be appropriate in certain restricted circumstances in the interests of good patient care and efficient use of health care resources. The CMA’s Guidelines for the Delegation of a Medical Act were established to help physicians when they decide to delegate a medical act to a person other than a physician. Such delegation does not absolve the physician of responsibility for the care of the patient; it merely widens the circle of responsibility for the safe execution of the procedure.

Because medical knowledge is constantly changing, there is no generally accepted definition of a medical act. However, the practice of medicine embraces many medical procedures. In certain restricted circumstances and in the interests of good patient care and efficient use of health care resources, the delegation of a medical act to persons other than physicians may be appropriate.

Delegation of medical acts is an evolutionary process that can have significant implications for the practice of medicine. With time, there have been changes in the nature of acts that are delegated. In addition, if medical acts become incorporated into the accepted scope of practice of other disciplines, the boundaries of medical practice may change. Before delegating a medical act, physicians should consider whether the delegation will compromise the close doctor-patient relationship, which is such an essential element of the art and science of the practice of medicine.

In some jurisdictions the process of delegation is highly formalized, in others less so. Nevertheless, there are some common constraints that affect the delegation process. It is likely that these will more often be applicable in an institutional setting involving complex procedures in critical care or emergency situations than in office settings in which staff provide assistance to the physician by performing routine procedures. The following guidelines are intended to assist physicians when they decide to delegate a medical act to another health care worker and apply to medical procedures that are outside the usual scope of another discipline.

Description
The medical act must be clearly defined and circumscribed with the degree of medical supervision indicated. The supervision may be direct, with the physician in attendance, or through telemedicine (video link, digital imaging, telephone or radio communication) or according to a written protocol.

Approval
Only certain medical acts may be delegated. There should be a broad consensus from the medical community (local, provincial, national and specialty organizations) that the delegation is appropriate. There must also be formal assent from the provincial licensing authority.

Agreement
Even if there is formal and informal agreement within the medical community that a medical act may be delegated, the decision to delegate remains with the physician. In addition, agreement must be obtained from the board of directors of an institution before delegated medical acts can be carried out in that institution.
Acceptance
Before a medical act can be delegated, the people to whom it can be delegated must be willing to accept the delegation. Acceptance should include discussion with peers, possibly through the professional organization or the legislatively responsible body.

Competence
The competency requirements for performing a particular medical act must be clearly identified. Determining whether an individual has the appropriate knowledge base may involve assessing the scope of practice of the person’s professional group to determine what additional training is needed. If a complex medical procedure is delegated, a physician with relevant expertise must ensure that the required knowledge and skill are appropriately taught. The teaching, but not the examination for competence, may be carried out by a non-physician. The dated record of examination must be signed by the physician who is attesting to the competence of an individual to perform a specified act.

The individual performing the delegated medical act and a physician with relevant expertise should indicate that competence in performing a particular medical act has been maintained through re-evaluation and, if necessary, retraining. The question of maintaining competence should be considered annually by the physicians, allied health care professionals or organizations concerned.

Responsibility
When a medical act that is outside the accepted scope of practice of another discipline is delegated, the responsibility for this act is shared. The physician who delegates the act still has a responsibility to the patient; the physician who attests to the competence of another person to perform the act carries a responsibility regarding the initial level of competence achieved; the person who carries out the act must do so with care and diligence and is legally liable if negligent. The board of directors of an institution has a responsibility to ensure a process is in place to provide appropriately trained and competent personnel to perform the delegated medical acts that are acceptable to the institution. It is important that employers or trustees of institutions maintain records of employees trained in special procedures; these records need to be available to physicians who choose to delegate a medical act.

DMS 4.0 The delegation of medical acts does not compromise patient safety or quality.

DMS 4.1 Delegated medical acts are clearly defined.

DMS4.1.1 M Each delegated medical act is clearly defined and circumscribed.

DMS4.1.2 M The degree of medical supervision required is identified.

Guidance: Medical supervision may be direct, with the physician in attendance, or through technology (video link, digital imaging, telephone), or according to a written protocol.

DMS4.1.3 M Competency requirements to perform the delegated medical act are clearly identified.
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DMS  4.2  The delegation of medical acts has been approved and accepted.

DMS4.2.1  M  ☐ There is consensus from the medical community that the delegation of the medical act is appropriate.
DMS4.2.2  ☐ Consultation with the College of Physicians and Surgeons of British Columbia has taken place.
DMS4.2.3  M  ☐ The delegation of the medical act has been accepted by the individual(s) who will perform the delegated medical act.
DMS4.2.4  M  ☐ Agreement from the governing body/ownership of the organization has been obtained prior to the delegated medical act being carried out in the organization.

DMS  4.3  Delegated medical acts are performed by competent individuals.

DMS4.3.1  M  ☐ Additional training is provided to individuals performing the delegated medical act.
DMS4.3.2  M  ☐ An assessment of the competence of the individual to perform a specific act is conducted by a physician.
Guidance: The physician conducting the assessment should have the relevant expertise in the medical act.

The record of the assessment of competence for each individual:

DMS4.3.3  M  ☐ identifies the name of the individual, and
DMS4.3.4  M  ☐ the date of the assessment, and
DMS4.3.5  M  ☐ the specific act(s) being assessed, and
DMS4.3.6  M  ☐ the name of the physician conducting the assessment, and
DMS4.3.7  M  ☐ the signature of the physician attesting to the competence of the individual performing the specific act(s).

DMS4.3.8  M  ☐ Maintenance of competency of the individual performing the specific act(s) is reassessed annually by a physician with relevant expertise in the medical act.
DMS4.3.9  M  ☐ The record of assessment of competence for each individual is updated annually to record the reassessment.

DMS  4.4  The organization maintains documentation of delegated medical acts.

DMS4.4.1  M  ☐ The imaging service maintains a list of approved medical acts that have been delegated.
DMS4.4.2  M  ☐ A list of individuals authorized to conduct specific delegated medical acts is maintained.
CONTINUING EDUCATION

Introduction:
Continuing medical education is an essential element to ensuring that medical practitioners maintain their skills and competency and also remain knowledgeable about advances in their branch of medicine. Continuing education is also a requirement of the College of Physicians and Surgeons of British Columbia for renewal and revalidation of licensure.

DMS 5.0 Medical practitioners participate in continuing education.

DMS 5.1 Continuing education activities are undertaken to maintain clinical skills and current competence.

DMS5.1.1 Medical practitioners undertake education that relates to the medical services they provide.

DMS5.1.2 A record of continuing education completed by individual practitioners is maintained.

DMS5.1.3 Participation in continuing education is considered in decisions about renewal or revision of individual privileges/scope of service.

MEDICAL STAFF CONTRACTS

Introduction:
Medical practitioners may be employees of an organization or may operate as independent medical practitioners under contract to a group or to the organization. Having a contract in place assists both parties to articulate expectations and communicates how disagreements will be resolved.

DMS 6.0 The imaging service effectively manages relationships with medical practitioners under contract.

DMS 6.1 The imaging service management maintains current and accurate records of the medical practitioners providing services.

DMS6.1.1 M An accurate current list of all medical practitioners associated with the imaging service is maintained.

DMS6.1.2 M There is evidence of current licensure of all medical practitioners with the College of Physicians and Surgeons of British Columbia.
DMS 6.2 There is a contract in place between the medical practitioner/group and the imaging service that specifies:

DMS6.2.1 services to be provided to the imaging service.
DMS6.2.2 names of the medical practitioner(s) providing the services.
DMS6.2.3 hours of service provision by the medical practitioner(s).
DMS6.2.4 location of where the medical practitioner(s) will be providing service.
DMS6.2.5 provision for on-call service during and outside regular operating hours.
DMS6.2.6 participation in quality improvement activities.³
DMS6.2.7 compliance with occupational health and safety regulations.
DMS6.2.8 compliance with organizational and imaging service policies and procedures.
DMS6.2.9 undertaking of continuing medical education on a yearly basis.

DMS 6.3 There is a designated individual(s) assigned to manage the contract between the medical practitioner/group and the imaging service to:

DMS6.3.1 ensure an effective and quality service is provided.
DMS6.3.2 document any changes to the contract.
DMS6.3.3 resolve any concerns brought forward by either party.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


College of Physicians and Surgeons of British Columbia. Delegated medical act publications.

College of Physicians and Surgeons of Manitoba. Statement 130: Delegation of Function: Principles

Joint Commission 2009 Hospital Accreditation Standards. Illinois, USA.

SPECIFIC DOCUMENTS REFERENCED

1 American College of Radiology. ACR Practice Guideline of the Performance of Screening and Diagnostic Mammography. 2008 (Res.24).


3 Health Canada Safety Code 33, Section 3.2.3
Introduction:
The management of human resources encompasses the policies, procedures and systems that influence the behavior, attitudes and performance of staff. The imaging service must have methods in place to ensure that staff are managed as effectively as possible, as the quality of care and services provided within the imaging service will be greatly affected by the quality of the staff working in the department.

Ultimately, it is the staff working within the imaging service who are responsible for providing care and services to patients. Therefore, the imaging service must have a strategy in place to ensure that qualified and competent staff are recruited and retained and that they are motivated and engaged in the work that they do. This will help to ensure that the needs and requirements of the imaging service and the population served by them are effectively and safely met.

The Human Resources accreditation standards examine the practices of planning for staff and achieving performance through people. The standards provide direction on the imaging service management activities of: assessing and obtaining the human resources required to provide service; fostering and supporting an environment that encourages people to reach their full potential; treating people with respect and trust and encouraging them to contribute ideas or voice their opinions on issues of concern without fear of retribution; and building and maintaining a work environment and staff climate conducive to personal and organizational growth.

The Human Resources section of the accreditation standards addresses:

- Human resources planning
- Recruitment of qualified and competent people
- Retention of qualified and competent people
- Staff participation and well-being
- Roles and accountabilities
- Enhancing the performance of staff in a learning environment
HUMAN RESOURCES PLANNING

Introduction:
Human resources planning consists of a series of activities which allow an imaging service to
determine whether it has the human resources necessary to meet its goals and objectives and to
address deficiencies where necessary. Some of these activities include forecasting, goal setting and
strategic planning. The human resources planning process assists the imaging service in defining the
qualifications, competencies, and staffing necessary to provide high quality care and services. An
effective human resources strategy/plan enables the imaging service to make sure that it has the
right people, in the right places, at the right time to achieve its goals and objectives in a safe and
efficient manner.

DHR 1.0 The imaging service identifies current and future human resource
requirements.

DHR 1.1 Human resource planning supports the imaging service’s goals and objectives and includes:

- DHR1.1.1 identifying age demographics of staff.
- DHR1.1.2 identifying adequate staffing numbers and required competencies.
- DHR1.1.3 anticipating and responding to changes in the environment.
- DHR1.1.4 anticipating and assessing the impact of technological change.
- DHR1.1.5 anticipating and responding to potential changes to workforce capability and
capacity needs.

DHR 1.2 The human resources planning process involves key staff and other health
professionals who:

- DHR1.2.1 are knowledgeable about advances in service delivery and technology.
- DHR1.2.2 are able to determine the required competencies of staff.

DHR 1.3 An implemented human resources plan:

- DHR1.3.1 ensures adequate staff resources for the scope of services provided.
- DHR1.3.2 is monitored to determine if expected results have been achieved.
- DHR1.3.3 is revised as necessary.

DHR 1.4 Clinical training placements are:

- DHR1.4.1 included in the human resources plan.
- DHR1.4.2 resourced to ensure appropriate space, equipment and funding is available.
- DHR1.4.3 supported by the organization.
RECRUITMENT OF QUALIFIED PEOPLE

Introduction:
Human resources recruitment consists of activities carried out by the imaging service to identify and attract qualified and competent potential employees. The imaging service must provide the correct types and numbers of qualified and competent staff necessary to provide the appropriate care, procedures and services to patients. All staff employed by the imaging service must be appropriately trained, qualified and competent to carry out their role and associated accountabilities. This protects patients from the risk of harm presented by an insufficient number of qualified staff to provide services and/or from the presence of unqualified and unsuitable workers.

DHR 2.0 The imaging service has procedures in place to ensure that qualified and competent staff are recruited.

DHR 2.1 The imaging service selects and recruits staff based on:
- qualifications including active licensure and registration or certification with the appropriate provincial or nationally recognized regulatory and/or certification body.
- academic preparation.
- knowledge, skills and experience.
- reference checks.

DHR 3.0 The radiology service has qualified, competent staff to deliver services.
Guidance: See also Medical Staff Accreditation Standard DMS 2.3 and DMS 3.1 – DMS 3.5.

DHR 3.1 Technical staff providing radiological services:
- are certified with the Canadian Association of Medical Radiation Technologists (CAMRT) or, are graduates of an accredited training school of radiology and are eligible to write the CAMRT certification examinations, or are certified Combined Laboratory/X-ray Technologists (CLXT).

DHR 3.2 There is a defined scope of practice for CLXT staff.
- The scope of practice is in alignment with their certification.
  Intent: Under their certification, a CLXT technologist has a limited scope of imaging examinations that they may conduct. If the CLXT technologist is required to practice outside of this limited scope, competency in the performance of the examination must be assured prior to the technologist working independently.
DHR 4.0  The mammography service has qualified, competent staff to deliver services.
Guidance: See also Medical Staff Accreditation Standard DMS 2.4 and DMS 3.1 – DMS 3.5.

DHR 4.1  Technologists providing mammography services:
DHR4.1.1  □ are certified with the Canadian Association of Medical Radiation Technologists (CAMRT).
DHR4.1.2  □ have special training in mammography, either through the training curriculum or special courses.
DHR4.1.3  □ are specifically trained in mammography QC and perform routine QC tests and record keeping.
DHR4.1.4  □ attend 15 hours of continuing education in Mammography every three years.

DHR 4.2  Medical Physicists providing mammography services:
DHR4.2.1  □ are accredited in mammography by the Canadian College of Physicists in Medicine (CCPM), the American Board of Radiology (ABR), or the American Board of Medical Physics (ABMP).

DHR 5.0  The ultrasound service has qualified, competent staff to deliver services.
Guidance: See also Medical Staff Accreditation Standard DMS 2.5 – DMS 2.7.

DHR 5.1  Sonographers providing ultrasound services:
DHR5.1.1  □ are certified with the Canadian Association of Registered Diagnostic Ultrasound Professionals (CARDUP) or the American Registry of Diagnostic Medical Sonographers (ARDMS) or, are graduates of an accredited training school of ultrasound and are in the process of writing their CARDUP or ARDMS certification examinations.
DHR5.1.2  □ that includes performing breast ultrasound are certified with the ARDMS.
DHR5.1.3  □ that includes performing vascular imaging (e.g. carotids, peripheral vascular, abdominal vascular imaging, etc.) have received didactic and practical training specific to those areas.

DHR 5.2  If the interpreting physician is not on-site, the medical leader ensures that:
DHR5.2.1  □ the caseload is sufficient to maintain the sonographer’s skills and efficiency.
DHR5.2.2  □ the sonographers are provided time with an interpreting physician or the opportunity to visit the reporting facility both prior to the commencement of the service and on an annual basis. The frequency of visits per year is defined and documented by the medical leader.
DHR5.2.3  □ there is ongoing support for continuing education.
DHR 6.0  The echocardiography service has qualified, competent staff to deliver services. 
Guidance: See also Medical Staff Accreditation Standard DMS 2.8.

DHR 6.1  Cardiac sonographers providing TTE services:  
DHR6.1.1  M have obtained certification in Adult and/or Pediatric Echocardiography from the Canadian Association of Registered Diagnostic Ultrasound Professionals (CARDUP) or the American Registry of Diagnostic Medical Sonographers (ARDMS).

DHR 6.2  If the interpreting physician is not on-site, the medical leader ensures that:  
DHR6.2.1  the caseload is sufficient to maintain cardiac sonographer’s skills and efficiency.  
DHR6.2.2  M cardiac sonographers are provided time with an interpreting physician or the opportunity to visit the reporting facility both prior to the commencement of the service and on an annual basis. The frequency of visits per year is defined and documented by the medical leader.  
DHR6.2.3  there is ongoing support for continuing education.

DHR 6.3  Cardiac sonographers providing TEE services:  
DHR6.3.1  M have obtained certification in Adult and/or Pediatric Echocardiography from the Canadian Association of Registered Diagnostic Ultrasound Professionals (CARDUP) or the American Registry of Diagnostic Medical Sonographers (ARDMS).

DHR 7.0  The CT service has qualified, competent staff to deliver services.  
Guidance: See also Medical Staff Accreditation Standard DMS 2.9.

DHR 7.1  Technologists providing CT services:  
DHR7.1.1  M are certified with the Canadian Association of Medical Radiation Technologists (CAMRT).  
DHR7.1.2  have completed an advanced specialty program in Computed Tomography or an equivalent combination of education, training and experience.  
DHR7.1.3  participate in continuing education that is encouraged by the CAMRT as well as the British Columbia Association of Medical Radiation Technologists (BCAMRT).  
DHR7.1.4  in a supervisory capacity have completed the British Columbia Institute of Technology (BCIT) or CAMRT certification program.

DHR 7.2  Medical Physicists providing CT services:  
DHR7.2.1  M are certified in Diagnostic Radiological Physics by the Canadian College of Physicists in Medicine (CCPM), the American Board of Radiology (ABR), or the American Board of Medical Physics (ABMP).  

have specific training and experience in:  
DHR7.2.2  CT physics.  
DHR7.2.3  system components and performance.  
DHR7.2.4  safety procedures.
DHR 8.0 The MRI service has qualified, competent staff to deliver services.
Guidance: See also Medical Staff Accreditation Standard DMS 2.10.

DHR 8.1 Technologists providing MRI services:
DHR8.1.1 M □ are certified with the Canadian Association of Medical Radiation Technologists (CAMRT) in MRI (RTMR).
DHR8.1.2 □ participate in continuing education that is encouraged by the CAMRT as well as the British Columbia Association of Medical Radiation Technologists (BCAMRT).

DHR 8.2 Medical physicists providing MRI services:
DHR8.2.1 M □ are certified in MRI by the Canadian College of Physicists in Medicine (CCPM), the American Board of Radiology (ABR), or the American Board of Medical Physics (ABMP).

have specific training and experience in:
DHR8.2.2 □ MRI physics.
DHR8.2.3 □ system components and performance.
DHR8.2.4 □ safety procedures.
DHR8.2.5 □ acceptance testing.
DHR8.2.6 □ quality control testing.

DHR 9.0 The nuclear medicine service has qualified, competent staff to deliver services.
Guidance: See also Medical Staff Accreditation Standard DMS 2.11 – DMS 2.13.

DHR 9.1 Technologists providing Nuclear Medicine services:
DHR9.1.1 M □ are certified with the Canadian Association of Medical Radiation Technologists (CAMRT) or, graduates of an accredited training school of nuclear medicine and are in the process of writing their CAMRT certification examinations.
DHR9.1.2 □ hold a Transportation of Dangerous Goods certification, where appropriate.
DHR9.1.3 □ that use SPECT/CT hybrid systems have completed Computed Tomography continuing education courses or an equivalent combination of in-house education and training in physics and instrumentation and CT clinical applications.
DHR 9.2  Medical Physicists providing Nuclear Medicine services:
DHR9.2.1  Medical Physicists are certified in Nuclear Medicine Physics by the Canadian College of Physicists in Medicine (CCPM), the American Board of Radiology (ABR), or the American Board of Medical Physics (ABMP).

have specific training and experience in:

- DHR9.2.2  nuclear medicine physics.
- DHR9.2.3  system components and performance.
- DHR9.2.4  safety procedures.
- DHR9.2.5  acceptance testing.
- DHR9.2.6  quality control testing.
- DHR9.2.7  have specific training and experience in Computed Tomography physics and instrumentation where SPECT/CT hybrid systems are used.

DHR 10.0  The bone densitometry service has qualified, competent staff to deliver services.
Guidance: See also Medical Staff Accreditation Standard DMS 2.14.

DHR 10.1  Technologists providing Bone Densitometry services:
DHR10.1.1  Technologists are certified with the Canadian Association of Medical Radiation Technologists (CAMRT) or, are graduates of an accredited training school of Radiology or Nuclear Medicine technology and are in the process of writing their CAMRT certification examinations.
DHR10.1.2  At least one technologist working within the bone densitometry service has current certification from the International Society for Clinical Densitometry (ISCD).

DHR 11.0  The imaging service has qualified, competent staff to deliver complex interventional procedures.
Note: Complex Interventional procedures are procedures that carry a high risk of emergency patient management or morbidity or mortality. Included are those procedures that involve either moderate sedation or general anesthesia. Vascular interventional procedures are one example of complex interventional procedures.
Guidance: See also Medical Staff Accreditation Standard DMS 2.15.

DHR 11.1  Technologists providing complex interventional services:
DHR11.1.1  have received a minimum of three months of supervised on-the-job training.
DHR11.1.2  work independently only after the successful completion of training.

DHR 11.2  Nurses providing complex interventional services:
DHR11.2.1  are registered with the College of Registered Nurses of British Columbia (CRNBC).
DHR11.2.2  have a minimum of one year of critical care nursing experience.
DHR 12.0 The imaging service has qualified and competent staff for image and clinical information management.

Intent: Facilities performing digital image processing should have access to an individual who is trained and experienced in maintenance and quality control of information technology software and hardware such as those for PACS and teleradiology equipment. Depending on the facility, the individual may be on-site or available upon request. The required qualification of the individual will depend on the type of facility and the type of equipment used in the facility.

DHR 12.1 The Information Systems Specialist (e.g. RIS/PACS Coordinator):

- DHR12.1.1 M is educated and experienced in information technology.
- DHR12.1.2 M has equipment-specific training as provided by manufacturers.
- DHR12.1.3 M is identified and appointed by the imaging service.
- DHR12.1.4 M has defined responsibilities.

Guidance: Responsibilities include the monitoring of quality; confidentiality of transmitted images; and maintaining a viable system.

- DHR12.1.5 M is provided with orientation and training to fulfill their role and responsibilities.

DHR 13.0 The imaging service has qualified and competent staff for the service and maintenance of equipment.

Intent: The service and maintenance personnel are individuals authorized to perform hardware and software repairs and maintenance on X-ray generators, control systems, imaging systems and their operating software. Depending on the facility, these functions may be: provided by individuals that are on-site or available upon request; provided contractually through an outside organization, or provided by the equipment manufacturer. The required qualifications of this individual will depend on the type of facility and the type of equipment used in the facility.

DHR 13.1 Service and maintenance personnel:

- DHR13.1.1 M have specific knowledge and training in the repair and maintenance of imaging equipment.
- DHR13.1.2 M have knowledge and training in radiation protection principles and procedures for equipment that uses ionizing radiation.
RETENTION OF QUALIFIED PEOPLE

Introduction:
An imaging service’s most valuable assets are its staff. Turnover is costly and affects the dynamics of a team; therefore, strategies to retain qualified and competent staff and to ensure that staff are supported, motivated and engaged in the work that they do, should be implemented by the imaging service.

DHR 14.0  The imaging service is able to retain its staff and maintain a competent, qualified and engaged workforce.

DHR 14.1  The imaging service has strategies in place to retain qualified staff.
- DHR14.1.1  Contributions by staff are recognized.
- DHR14.1.2  Incentives are in place to encourage high performance work.
- DHR14.1.3  Professional development is encouraged and supported.
- DHR14.1.4  Well being is promoted and enabled in the workplace.
- DHR14.1.5  Workloads are monitored and managed.
- DHR14.1.6  Information gained through exit interviews is used to enhance retention strategies.

DHR 14.2  The imaging service has strategies in place to assess and enhance workforce engagement, motivation and morale.
- DHR14.2.1  Staff are involved in decision-making for decisions within the defined scope of their role.
- DHR14.2.2  Workforce engagement, motivation and morale are assessed using methods that allow for anonymous participation by staff.
- DHR14.2.3  Information is used for future improvement opportunities.
- DHR14.2.4  Teamwork and knowledge sharing is encouraged.

DHR 14.3  There is a process for staff to bring forward concerns and complaints.
- DHR14.3.1  Staff are aware of how to bring forward issues.
- DHR14.3.2  The imaging service leadership responds to issues in a fair, objective and timely manner.

DHR 14.4  There are appropriate mechanisms in place to manage the impact of change. Change management processes include:
- DHR14.4.1  assessing the impact to staff.
- DHR14.4.2  ensuring appropriate mechanisms for two-way communication are in place.
- DHR14.4.3  a system to support staff.
- DHR14.4.4  involving staff in the implementation of changes, as appropriate.

monitoring the impact of changes on service delivery by:
- DHR14.4.5  measuring impact through pre and post indicator tracking.
- DHR14.4.6  mitigating any loss to service level or quality.
ROLES AND ACCOUNTABILITIES

Introduction:
Staff within the imaging service should be provided with the information necessary to ensure that they are knowledgeable about their role and the terms and conditions of their employment. This will help to ensure that staff practice within their scope and that they provide a high quality of care and services in accordance with the scope of their role and accountabilities. Human resources records provide evidence and documentation of an employee’s suitability for their role. Qualifications and credentials, competency and performance evaluations should be verified and included as part of the record and should be kept confidential. Only those who have permission and/or who are authorized to view the record as defined in policy should have access to it.

DHR 15.0 The staff and leadership of the imaging service understand their roles and accountabilities.

DHR 15.1 Position and/or job descriptions exist for all staff and include:
- DHR15.1.1 position and/or job summary.
- DHR15.1.2 nature and scope of work.
- DHR15.1.3 qualifications required.
- DHR15.1.4 reporting relationships.
- DHR15.1.5 conditions of employment.
- DHR15.1.6 performance measures.

DHR 15.2 Position and/or job descriptions are regularly reviewed and revised to reflect:
- DHR15.2.1 current practice.
- DHR15.2.2 changing performance requirements, duties or qualifications.

DHR 15.3 Reporting relationships are clear and understood by staff.
- DHR15.3.1 Reporting relationships have been communicated to individual staff.
- DHR15.3.2 Staff are aware of the reporting structure and who to take direction from.

DHR 16.0 Staff records are complete, current and kept confidential.

DHR 16.1 Individual human resource records are kept for all staff and contain:
- DHR16.1.1 evidence of qualifications including current licensure and certification or registration, if applicable.
- DHR16.1.2 evidence of credentialing and granting of privileges, if applicable.
- DHR16.1.3 evidence of education and training appropriate for the position.
- DHR16.1.4 position and/or job description.
- DHR16.1.5 immunization status at time employment commences.
- DHR16.1.6 health reports as may be required by the organization’s human resources policies.
- DHR16.1.7 orientation, continuing education and in-service training records.
- DHR16.1.8 performance evaluations.
### ACCREDITATION STANDARDS

**HUMAN RESOURCES**

| DHR16.1.9 | □ competency assessments. |
| DHR16.1.10 | □ recruitment information including references. |
| DHR16.1.11 | □ evidence of professional liability insurance coverage, if applicable. |
| DHR16.1.12 | □ evidence of criminal records check if in contact with children. |
| DHR16.1.13 | □ evaluations and feedback provided by staff. |

**DHR 16.2** Human resource information and records are maintained in a confidential manner.

| DHR16.2.1 | M □ Only authorized individuals have access to records. |
| DHR16.2.2 | M □ Consent is obtained from the employee prior to the release of information contained in their human resources record. |
| DHR16.2.3 | M □ Records are disposed of appropriately and in accordance with legislation. |

### ENHANCING PERFORMANCE IN A LEARNING ENVIRONMENT

**Introduction:**

The imaging service must ensure that it functions within a culture that is supportive of learning and continuous professional development. Staff performance is directly impacted by the quality of orientation, training and continuing development opportunities provided to them. Staff orientation, training and continuing education promotes safe and effective job performance by maintaining and improving staff competence and facilitating staff development. A key function of enhancing performance in a learning environment is performance management, which allows for staff performance and competence to be assessed and evaluated in order to provide constructive feedback, provide training and education and make improvements as necessary to ultimately improve the quality of imaging services provided to patients.

**DHR 17.0** Orientation, training and continuing education for the safe provision of quality imaging services is provided.

**DHR 17.1** Orientation is provided to all new staff.

Orientation and initial training about the organization, imaging service and the staff’s position includes the following information:

| DHR17.1.1 | □ mission, vision, values, goals and objectives. |
| DHR17.1.2 | □ programs and services. |
| DHR17.1.3 | □ roles and responsibilities of the individual and key staff. |
| DHR17.1.4 | □ policies of the organization and imaging service and the responsibility for staff to comply. |
| DHR17.1.5 | □ relevant policies and procedures related to performing the duties of the position. |
| DHR17.1.6 | □ protecting patient confidentiality. |
| DHR17.1.7 | □ protecting patient rights, including understanding ethical aspects of care, procedures, and services. |
| DHR17.1.8 | □ sensitivity to cultural diversity as it applies to the responsibilities of the position. |
| DHR17.1.9 | □ quality improvement and risk management practices. |
Orientation provides training and information about safety that includes:

DHR17.1.10  M  management of aggressive behaviour.
DHR17.1.11  M  violence and harassment in the workplace.
DHR17.1.12  M  sharps handling and disposal.
DHR17.1.13  M  fire safety.
DHR17.1.14  M  management of infectious material including routine precautions, needle stick injury protocol, staff personal protective equipment and other safety equipment.
DHR17.1.15  M  management of cardiac and respiratory arrest.
DHR17.1.16  M  musculo-skeletal injury prevention.
DHR17.1.17  M  WHMIS and other local, provincial and federal requirements.
DHR17.1.18  M  emergency response codes.
DHR17.1.19  M  disaster response.
DHR17.1.20  M  the need and ways to report staff injuries.
DHR17.1.21  M  the principles of patient safety.

DHR 17.2  Orientation is provided to existing staff in response to:

DHR17.2.1  changing roles.
DHR17.2.2  new technology.
DHR17.2.3  changes in competency demands.
DHR17.2.4  new laws and regulations.

DHR 17.3  Staff are supported and provided with ongoing education, training and professional development to:

DHR17.3.1  maintain and upgrade knowledge and skills as required to meet the needs of the imaging service.
DHS17.3.2  maintain competency requirements.
DHR17.3.3  encourage working as an integrated team.
DHR17.3.4  carry out quality improvement activities.
DHR17.3.5  provide services that are patient focused.

DHR 17.4  The imaging service monitors education and training to:

DHR17.4.1  determine if objectives have been achieved.
DHR17.4.2  determine the degree of application of knowledge.
DHR17.4.3  ensure sharing and dispersion of knowledge.
DHR17.4.4  gather feedback and evaluation of the education and training from staff to make modifications as necessary.
DHR17.4.5  identify improvement opportunities.
DHR17.4.6  ensure that opportunities for reinforcement of knowledge and re-training are made available as necessary.
DHR 17.5  The imaging service has the staff to fulfill clinical teaching obligations.
DHR17.5.1  Staff involved in clinical teaching understand their role and responsibilities.
DHR17.5.2  Staff assigned to clinical teaching have the appropriate qualifications, as specified by the academic institution.

DHR 17.6  Participation in clinical teaching does not compromise patient care.
DHR17.6.1  Students are supervised by experienced and qualified staff.
DHR17.6.2  Service standards of the imaging service are maintained.

DHR 18.0  The imaging service has a staff performance management system to improve quality of service.

DHR 18.1  Individual staff receive performance feedback.
DHR18.1.1  Staff is evaluated based on performance expectations reflecting job responsibilities.
DHR18.1.2  There are opportunities to provide continuous feedback.
DHR18.1.3  An annual performance appraisal is conducted.
DHR18.1.4  Feedback is objective and interactive.
DHR18.1.5  Feedback results in the generation of a development plan.
DHR18.1.6  Development plans are monitored and revised as necessary.

DHR 18.2  The competency of individual staff is assessed.
Intent: Competency assessments assess the knowledge, skills and abilities of staff to ensure that they are competent in performing their role, responsibilities and accountabilities as defined by their job description. At a minimum, competency assessments must include safe operation of equipment; accurate positioning for localization of regions of interest; and performance of manufacturer and imaging service quality assurance procedures.

DHR18.2.1  M  Competency of new staff is assessed at the completion of a probationary and/or orientation period.
DHR18.2.2  M  Competencies of existing staff is assessed when new technology and/or procedures are introduced.
DHR18.2.3  M  Existing staff members are assessed on the use of current technology and/or procedures prior to performance appraisals.
DHR18.2.4  M  Competency of staff is assessed by someone with the education, experience and qualifications to do so.
DHR18.2.5  M  Action is taken when a staff member’s competence does not meet expectations and/or when the staff member is not performing satisfactorily.
DHR18.2.6  M  The staff member and the individual conducting the assessment both review and sign the final assessment.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


ACCREDITATION STANDARDS 2010

PATIENT AND CLIENT FOCUS

Introduction:
Patient and Client Focus refers to the methods the imaging service has in place to engage its patients and clients so that they are involved in patient care to the fullest extent possible and to ensure that their needs are being met in a safe and effective manner. Having a patient and client focused culture enables the imaging service to be more responsive to patient and client needs and requirements and potentially enhances the quality and safety of the care and services provided to patients.

The Patient and Client Focus Standards examine patient and client-centered services including how the imaging service determines the requirements, expectations and preferences of patients and other client groups. Examples of clients may include referring physicians, WorkSafe BC, insurance companies, and others.

The Patient and Client Focus section of the accreditation standards addresses:
- Management of patient and client relationships
- Measurement of patient and client satisfaction
- Patient rights

MANAGEMENT OF PATIENT AND CLIENT RELATIONSHIPS

Introduction:
A positive patient and client focused culture requires effective management of patient and client relationships. This involves a clear understanding of the needs of patients and clients which enables the imaging service to identify and anticipate key patient and client requirements and to ensure appropriate resources and programs are in place to effectively meet the needs of the population served.

DPC 1.0 The imaging service seeks to understand and be responsive to the requirements of patients and clients.

DPC 1.1 The imaging service seeks to understand the requirements of patients and clients.
- Patient and client groups are identified and defined.
- Patient and client requirements are identified and defined.
**ACCREDITATION STANDARDS**

**PATIENT AND CLIENT FOCUS**

<table>
<thead>
<tr>
<th>DPC 1.2</th>
<th>Planning takes patient and client requirements and expectations into consideration.</th>
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</thead>
<tbody>
<tr>
<td>DPC1.2.1</td>
<td>The goals and objectives of the imaging service are aligned with patient and client needs and expectations.</td>
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<tr>
<td>DPC1.2.2</td>
<td>Future services are planned taking into consideration the requirements and expectations of patients and clients.</td>
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<table>
<thead>
<tr>
<th>DPC 1.3</th>
<th>Service standards of the imaging service are defined and documented.</th>
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<tbody>
<tr>
<td>DPC1.3.1</td>
<td>M Emergent and non-emergent examinations are defined and identified for each modality.</td>
</tr>
<tr>
<td>DPC1.3.2</td>
<td>M Wait time to next available appointment for emergent examinations is defined for each modality.</td>
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<tr>
<td>DPC1.3.3</td>
<td>M Wait time to next available appointment for non-emergent examinations is defined for each modality.</td>
</tr>
<tr>
<td>DPC1.3.4</td>
<td>M There is a process for patient prioritization.</td>
</tr>
<tr>
<td>DPC1.3.5</td>
<td>M Turnaround time from examination to dictation is defined.</td>
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<tr>
<td>DPC1.3.6</td>
<td>M Turnaround time from dictation to transcription is defined.</td>
</tr>
<tr>
<td>DPC1.3.7</td>
<td>M Turnaround time from examination to receipt of final report for each modality is defined.</td>
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<tr>
<th>DPC 1.4</th>
<th>Final reports are provided in a manner that meets the needs of patients and clients.</th>
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<tr>
<td>DPC1.4.1</td>
<td>Turnaround times for final reports are communicated to referring practitioners.</td>
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<tr>
<td>DPC1.4.2</td>
<td>Final reports are provided in a timely manner as defined by the service standard.</td>
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<tr>
<td>DPC1.4.3</td>
<td>M Turnaround times for reports are monitored.</td>
</tr>
<tr>
<td>DPC1.4.4</td>
<td>There is a procedure for logging and documenting complaints from referring practitioners about final reports.</td>
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<tr>
<th>DPC 1.5</th>
<th>Interpreting physicians are responsive to patient-related clinician inquiries including:</th>
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<tbody>
<tr>
<td>DPC1.5.1</td>
<td>case specific inquiries.</td>
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<tr>
<td>DPC1.5.2</td>
<td>general inquiries, such as policies and procedures.</td>
</tr>
<tr>
<td>DPC1.5.3</td>
<td>providing education to clinicians in a timely and meaningful manner as needed.</td>
</tr>
</tbody>
</table>
MEASUREMENT OF PATIENT AND CLIENT SATISFACTION

Introduction:
Having methods in place to determine and measure patient and client satisfaction allows the imaging service to assess whether patient and client needs and expectations are being met and to identify areas for improvement to enhance the quality of care and services provided. Determining patient and client satisfaction and dissatisfaction might include the use of any of the following methods: surveys; formal and informal feedback; complaints; information on timeliness of service delivery, etc.

Patient and client complaints should be managed with a system to ensure that complaints are resolved promptly and effectively. This will enable the imaging service to ensure the confidence of patients and clients and enhance their satisfaction and engagement. Aggregation and analysis of complaints and dissatisfaction data will foster improvement throughout the imaging service.

DPC 2.0 Patient and client satisfaction is measured to gain information for improvement.

DPC 2.1 Collection of patient and client satisfaction feedback uses an approach that:
- DPC2.1.1 is appropriate for the collection of feedback from each patient and client group.
- DPC2.1.2 enables regular comparable measurement of data from one measurement cycle to the next.
- DPC2.1.3 enables the collection of actionable information linked to specific processes within the imaging service.

DPC 2.2 Patient and client satisfaction results are used to improve service delivery.
- DPC2.2.1 Patient and client satisfaction data is analyzed.
- DPC2.2.2 Goals and priorities for improvement are set.
- DPC2.2.3 There are methods to identify significant feedback that requires specific action.

DPC 2.3 There is a process in place to gather and follow-up on patient and client complaints.
- DPC2.3.1 Patients and clients are informed of the process to register complaints and feedback.
- DPC2.3.2 Responses to patient and client enquiries and complaints are addressed promptly and effectively.
- DPC2.3.3 Resolution of complaints is documented.
- DPC2.3.4 Feedback and lessons learned from complaints are used to make improvements as necessary.
PATIENT RIGHTS

Introduction:
By respecting patient rights and ensuring patients are aware of their rights, the imaging service empowers patients to take an active and participatory role in their care, to become more informed about the care provided to them, and to build rapport with the healthcare professionals involved in the provision of their imaging service(s). Respecting patient rights and involving patients in their care increases patient engagement and places the focus on them as owners of their health. It also helps to ensure that the imaging services are effectively meeting the needs of patients, taking their values, beliefs and preferences into consideration and making improvements as necessary.

Patient rights include (but are not limited to) the following:

- the right to be treated with dignity, respect and consideration.
- the right to privacy.
- the right to services that respect cultural and personal values, beliefs and preferences.
- the right to effective pain management.
- the right to continuity of care.
- the right to effective communication.
- the right to voice one’s opinion.
- the right to confidentiality.
- the right to safety and security.
- the right to request access to one’s health information in accordance with provincial law and regulation.
- the right to be free from any form of abuse, neglect and/or prejudice.
- the right to informed decision making.
- the right to receive information in a manner understood by patients.
- the right to informed consent.
- the right to participate in one’s healthcare decision making and planning.
- the right to safe, competent and ethical care provided by qualified health care providers.
- the right to request information on the qualifications of one’s provider(s) of health care.
DPC 3.0 The imaging service respects the rights of patients.

DPC 3.1 Patient rights are communicated to patients and staff.
DPC3.1.1 Staff are provided with training on, and are aware of, the rights of patients.
DPC3.1.2 Patients are informed of their rights.

DPC 3.2 Patients are involved in decision making about their care, procedure(s) and/or service(s). The imaging service respects the rights of patients to give or withhold consent.

DPC3.2.1 Patients are provided with information about their proposed care, procedure(s) and/or service(s) so that they can participate in making informed current and future health care decisions.
DPC3.2.2 Patients are provided with information about their right to refuse care, procedures, and/or services and this right is respected.
DPC3.2.3 When patients are unable to make decisions about their care, procedure(s), and/or services, a substitute decision maker(s) is involved in making these decisions in accordance with policy and provincial law and regulation.
DPC3.2.4 The imaging service informs patients about information related to the health care professionals responsible for their care, procedure(s) and/or service(s).
DPC3.2.5 Examination request guidelines (e.g. patient preparation) are available to patients and referring practitioners.

DPC 3.3 The imaging service respects the rights of patients to give or withhold consent.  

Intent: Obtaining informed consent is a process of communication that establishes a mutual understanding between the patient and healthcare provider(s) involved in the imaging procedure(s) and/or service(s) they will receive. It provides patients with the information they need to make informed decisions and ultimately results in the patient’s authorization or agreement to undergo the procedure and/or service for which informed consent is being obtained. Informed consent is a process that encompasses patient needs and preferences, patient education and compliance with the Health Care (Consent) and Care Facility (Admission) Act – see associated link: www.qp.gov.bc.ca/statreg/stat/H/96181_01.htm.

DPC3.3.1 Patients are informed of their right to give, refuse or revoke consent.
DPC3.3.2 Decisions made by a patient with regard to giving or withholding consent are respected.
The imaging service ensures that patients are provided with the information necessary to make informed decisions to give or withhold consent.

DPC 3.4.1 M □ The imaging service identifies the specific examinations, procedures, or services that require informed consent as well as the circumstances that would allow for exceptions to it.

Guidance: The following procedures will typically require consent to be obtained - invasive procedures requiring the insertion of needles, catheters or any incisional procedures; procedures requiring anesthesia and moderate or “conscious” sedation; participation in research or experimental procedures.

DPC 3.4.2 M □ The imaging service clearly identifies the healthcare providers who are authorized and responsible for obtaining informed consent.

DPC 3.4.3 M □ The informed consent process includes a discussion about the potential benefits, risks, alternatives and side effects of the patient’s proposed service(s) and/or procedure(s).

DPC 3.4.4 M □ The informed consent process includes discussion about the risks related to not receiving the proposed service(s) and/or procedure(s).

DPC 3.4.5 M □ Information for the informed consent process is provided to patients in a manner that they are able to understand.

DPC 3.4.6 M □ The informed consent process includes a discussion about circumstances under which patient information must be disclosed.

DPC 3.4.7 M □ The informed consent process includes an opportunity for patients to ask questions about their proposed service(s) and/or procedure(s).

DPC 3.4.8 M □ Informed consent is documented in the patient’s record in accordance with hospital or service policy and provincial legislation.

Guidance: Documentation should at a minimum contain the patient’s name; the date informed consent is obtained; a description of the procedure, examination or service for which informed consent is being obtained (including the date on which it will be performed); and whether the patient does or does not consent to the procedure, examination or service. Documentation may be recorded in the format of a form, in progress notes, or elsewhere in the patient’s record.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


Joint Commission 2009 Hospital Accreditation Standards. Illinois, USA.

SPECIFIC DOCUMENTS REFERENCED


GENERAL SAFETY

Introduction:
Establishing and maintaining a safe environment is a crucial element to ensuring the safety of staff, patients and visitors.

This section of the accreditation standards addresses:
- Key management responsibilities and activities as outlined in occupational health and safety regulations
- Safety practices
- The physical environment of the imaging service
- Preparing for disasters and emergencies

Occupational Health and Safety

The Diagnostic Accreditation Program would like to acknowledge the significant contributions made to this section of the accreditation standards by WorkSafe BC. The accreditation standards relating to occupational health and safety have highlighted those most critical to staff safety in the diagnostic imaging environment. However, they do not encompass all of the requirements under the Workers Compensation Act of British Columbia. Leaders are encouraged to review section 115 of this Act and the associated Occupational Health and Safety Regulations to ensure they are meeting all regulatory requirements in British Columbia. Questions specific to the Act and the associated Occupational Health and Safety Regulations should be directed to WorkSafe BC for interpretation, advice and direction.

Infection Control

Infection prevention and control activities protect staff, patients and visitors alike. Please refer to the Infection Prevention and Control Accreditation Standards for additional requirements and best practices.

Patient Safety

Safety practices directly related to protecting a patient’s safety are identified in the Patient Safety Accreditation Standards.
**MANAGEMENT RESPONSIBILITIES**

DSA 1.0  Potential hazards and risks to staff, patients and visitors are minimized.

<table>
<thead>
<tr>
<th>DSA</th>
<th>1.1</th>
<th>There is a safety program in place that includes:</th>
</tr>
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<tbody>
<tr>
<td>DSA1.1.1</td>
<td>M</td>
<td>regular safety audits of the imaging service, equipment, work methods and practices to identify and resolve safety hazards.</td>
</tr>
<tr>
<td>DSA1.1.2</td>
<td>M</td>
<td>reviewing health and safety activities and incident trends.</td>
</tr>
<tr>
<td>DSA1.1.3</td>
<td>M</td>
<td>identifying and implementing courses of action to resolve health and safety concerns.</td>
</tr>
<tr>
<td>DSA1.1.4</td>
<td>M</td>
<td>the prompt investigation of staff related safety incidents to determine action necessary to prevent recurrence.</td>
</tr>
<tr>
<td>DSA1.1.5</td>
<td>M</td>
<td>the retention of records and statistics, including reports of safety inspections and staff incident investigations.</td>
</tr>
</tbody>
</table>

DSA 1.2  A safety manual is readily available to staff that includes:

<table>
<thead>
<tr>
<th>DSA</th>
<th>1.2</th>
<th>A safety manual is readily available to staff that includes:</th>
</tr>
</thead>
</table>
| DSA1.2.1 | M | how to access first aid services and/or medical assistance for staff related injuries.  
*Guidance: If the imaging service is part of a larger facility (over 50 staff), there must be immediate access to an Occupational First Aid Attendant (OFAA) with a minimum of a level 2 occupational first aid certificate. If the facility is self-contained, a level 1 OFAA is sufficient until the total staff surpasses 50. Detailed tables specifying the first aid requirements are found in the Occupational Health and Safety Regulation at the end of Part 3. It must be noted that medical facilities are NOT exempt from these requirements. Medical facilities may have staff take the appropriate OFA course but some leeway is provided to allow for existing qualification to be considered equivalent.

This information is provided in section 2.2.1 of the standard at [www2.worksafebc.com/publications/OHSRegulation/WCBStandards.asp?ReportID=33295](http://www2.worksafebc.com/publications/OHSRegulation/WCBStandards.asp?ReportID=33295)

<table>
<thead>
<tr>
<th>DSA</th>
<th>1.2</th>
<th>A safety manual is readily available to staff that includes:</th>
</tr>
</thead>
</table>
| DSA1.2.2 | M | the policy and procedure for reporting staff safety incidents.  
*Guidance: All minor injuries must be reported to first aid. More serious injuries that require medical attention and near misses with the potential for serious injury, must be formally investigated by the employer and a worker representative. Very serious incidents, as defined in section 172 of the Workers Compensation Act, must be immediately reported to WorkSafe BC. |
| DSA1.2.3 | M | the procedure for investigating staff safety incidents including the identification of the individual responsible for conducting the investigation. |
| DSA1.2.4 | M | the procedure for conducting monthly safety audits/inspections.  
*Guidance: Occupational health and safety regulations require safety audits/inspections to be conducted at least once per month and these audits must be reviewed by the joint occupational health and safety committee or health and safety representative at its monthly meetings. Workplace audits/inspections must be conducted formally by the employer. It is expected that supervisory staff are always ‘inspecting’, as they are expected to correct any hazards immediately that are seen. |
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**ACCREDITATION STANDARDS**

**GENERAL SAFETY**

DSA1.2.5  M □ exposure control plans for the exposure to biohazardous materials, or exposure to chemicals.

DSA1.2.6  M □ requirements for use of personal protective and other safety equipment in each area of the imaging service.

DSA1.2.7  M □ Workplace Hazardous Materials Information System (WHMIS) program information.

DSA1.2.8  M □ emergency evacuation plans.

Guidance: Emergency drills must be held at least once per year and records of these drills must be kept.

DSA1.2.9  M □ procedures to protect staff “working alone” or in “isolation”.

Guidance: "Working alone or in isolation" is defined as meaning working in circumstances where assistance would not be readily available to the worker in case of emergency or if the worker is injured or becomes unwell. The employer must identify any hazards, before a worker is assigned to work in isolation and those hazards must be eliminated or minimized prior to that work starting. There must be an effective check-in procedure, with the time intervals developed in consultation with the worker.

DSA1.2.10 M □ procedures to manage violent and aggressive behaviour.

Guidance: The procedure for dealing with the prevention of, and response to, incidents of violence must distinguish between incidents involving two workers ("Improper Conduct") and incidents of aggressive behaviour from a patient or member of the public ("Violence"). WorkSafe BC has publications providing guidance on assessing and mitigating hazards. All incidents of improper conduct and violence must be formally investigated, whether any injury occurred or not. Extensive information is provided in the manual "Take Care" at www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/take_care.pdf

**DSA 1.3** Safety issues are discussed and monitored.

DSA1.3.1  M □ The imaging service has a safety committee or health and safety representative.

Guidance: If there are 20 or more employees, a joint occupational health and safety committee (JOHSC) must be functioning. If the imaging service is part of a larger facility, a member of the committee must have the responsibility to represent the imaging service. If the facility has between 10 and 19 staff, the workers must select a person to be their Health and Safety Representative. This person, in effect, carries out the same functions as the committee in a larger facility. For organizations with less than 10 employees, the employer is required to hold regular meetings with the staff to discuss matters relating to maintaining a healthy and safe workplace. Records of these meetings must be kept. Sections 125 to 140 of the Workers Compensation Act provide all the details about committee requirements and function.

DSA1.3.2  M □ Minutes of the last three safety committee meetings are posted.

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3
SAFE PRACTICES AND EQUIPMENT

DSA 1.4 Chemicals are used, stored and disposed of safely.

DSA1.4.1 M Hazardous liquids such as corrosives are stored below eye level.

DSA1.4.2 M Containers for flammable liquids are kept as small as possible.

DSA1.4.3 M Containers for flammable liquids are kept closed when not in use.

DSA1.4.4 M Flammable liquids are stored in approved cabinets.

Controlled substances subject to WHMIS regulations have:

DSA1.4.6 M Material Safety Data Sheets (MSDS).

DSA1.4.7 M Containers labeled appropriately.

Guidance: This applies to both the original supplier issued container and any secondary containers that have a workplace label indicating: product name; safe handling procedures; and reference to MSDS.

DSA1.4.8 M Chemicals are disposed of in accordance with WHMIS requirements.

DSA 1.5 Spills are responded to in an effective and safe manner.

Guidance: Based upon the chemicals used (e.g. gluteraldehyde) the imaging service should consult with WorkSafe BC to determine if spill kits and/or spill control teams are required.

DSA1.5.1 M Chemical and biological spill kits are readily available.

Guidance: The type and number of spill kits will depend on the variety of chemicals in the imaging service and the quantities that are typically in use.

DSA1.5.2 M The procedures to control and clean-up spills are documented and readily available to staff.

Guidance: As with any emergency situations, staff should have prior training in the procedures and required personal protective equipment available.

DSA1.5.3 M There is a spill control team available to respond to significant spills.

DSA1.5.4 M Members of spill control team have respirators with the appropriate cartridges.

Guidance: Members of the spill control team will require respirators, preferably full-face piece, with the specific cartridges for each specific scenario - organic vapour, formaldehyde, mercury, pesticide etc.

Fit-testing for P100 or cartridge respirators is conducted:

DSA1.5.5 M before first use, and

DSA1.5.6 M at least once per year, and

DSA1.5.7 M if the user experiences physical changes that could affect the appropriate fit of the respirator, and

Guidance: Examples of physical changes could include weight gain or loss, facial hair, etc.
DSA 1.5.8 M □ records of fit testing are maintained.

*Guidance:* An example of a fit-test record form can be found in the WorkSafe BC publication "Breathe Safer", pages 78 and 79 at www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/breathe_safer.pdf

**DSA 1.7 Compressed gas is maintained and stored safely.**

*Guidance:* An example of a compressed gas would be helium used in MRI.

- **DSA 1.7.1** M □ Gas cylinders are clearly labeled with the cylinder’s contents.
- **DSA 1.7.2** M □ The content of the cylinder is the correct product for use in the system.
- **DSA 1.7.3** M □ A pressure-reducing regulator or device is used for all compressed gas cylinders.

*Guidance:* Only regulators that have both a high-pressure gauge and a low-pressure gauge should be used. This allows the monitoring of both the pressure in the compressed gas cylinder and the pressure in the system.

- **DSA 1.7.4** M □ The gas system does not exceed 75% of the maximum face reading on pressure indicating dial type gauges.

*Guidance:* For example, a 300 psi system should use at least 400 psi gauges.

- **DSA 1.7.5** M □ Any gauge whose pointer does not go back to the zero point when pressure is removed is replaced.
- **DSA 1.7.6** M □ Adapters between cylinders and pressure reducing regulators are NOT used.
- **DSA 1.7.7** M □ The pressure-reducing regulator used is compatible with the gas and is rated and marked for the maximum pressure rating of the CGA connection on the compressed gas cylinder as per CGA/ANSI V-1, Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections.

- **DSA 1.7.8** M □ Cylinders not in use are shut off and capped.
- **DSA 1.7.9** M □ Cylinders in use are secured by a holder or device specifically designed to secure a cylinder.
- **DSA 1.7.10** M □ Cylinders are protected from overhead hazards, high temperatures and other sources of damage.
- **DSA 1.7.11** M □ Cylinder carts are used to move large cylinders and specifically designed cylinder holders are used to carry small cylinders.
- **DSA 1.7.12** M □ Adequate 24 hour ventilation is available for cryogenic gases. If minimal amounts of gases are vented inside (i.e. not in a hood) continuous oxygen meters/monitors with low oxygen alarms are installed.

**DSA 1.10 Fire safety measures are implemented.**

- **DSA 1.10.1** M □ Appropriate fire extinguishing equipment and procedures are in place.
- **DSA 1.10.2** M □ Fire drills are conducted at least once per year.
**ACCREDITATION STANDARDS**

**GENERAL SAFETY**

**DSA 1.11**  
**Electrical safety measures are implemented.**

- **DSA1.11.1** M □ Equipment and supplies are clearly labeled and comply with electrical safety regulatory requirements (e.g. Canadian Standards Association [CSA] or equivalent).

- **DSA1.11.2** M □ Regular inspections are performed to assess electrical safety (e.g. extension cords and surge power bars are assessed for damage and inappropriate use, proper isolation of electrical equipment attached to the patient, etc.).

  **Intent:** Patients may be connected to, and may come in contact with, numerous pieces of electrical equipment that are to be safely engineered and routinely inspected. Proper design of the facilities primary wiring systems, proper electrical isolation of all equipment attached to the patient, grounding systems for all equipment, and an effective inspection program for the electrical system and measurements of electrical current leakage between all pieces of equipment that may come in contact with the patient are made during inspections.

**DSA 1.12**  
**Samples and dangerous goods are transported safely.**

- **DSA1.12.1** M □ Staff preparing patient samples for transport to another facility are certified in accordance with *Transport of Dangerous Goods (TDG) Regulations.*

- **DSA1.12.2** M □ Staff transporting patient samples and other dangerous goods are certified in accordance with *Transport of Dangerous Goods (TDG) Regulations.*

**DSA 1.13**  
**Personal protective equipment is available for staff.**

- **See also Radiation Safety Accreditation Standards and Infection Prevention and Control Accreditation Standards.**

- **DSA1.13.1** M □ Adequate and appropriate personal protective equipment is available.

  **Guidance:** Personal protective equipment is used to protect staff from the specific hazards associated with the work undertaken. As an example, the personal protective equipment may protect staff from chemical hazards; or, the equipment may protect staff from biological hazards; or the equipment may be to protect the staff from both biological and chemical hazards. Personal protective equipment may include safety goggles or safety glasses with side-shields, gloves, lab coats/gowns, N95 masks or respirators.

**DSA 1.15**  
**Safety practices are in place for all modalities to prevent staff injuries.**

- There are mechanisms in place to prevent staff from assuming postures that could result in musculo-skeletal injuries. These mechanisms include:

  - **DSA1.15.1** □ guidelines for equipment adjustment to ensure optimal ergonomics.
  - **DSA1.15.2** □ guidelines for proper body mechanics while performing examinations.
  - **DSA1.15.3** □ availability of positioning and immobilizing devices.
  - **DSA1.15.4** M □ adequate available assistance when moving heavy patients.
ACCREDITATION STANDARDS
GENERAL SAFETY

DSA1.15.5 M availability and use of appropriate patient transfer devices (e.g. transavers and slider boards).

DSA1.15.6 M availability of patient lifts where the workload includes the transfer or lift of heavy and/or immobile patients.

DSA1.15.7 M clear marking of the weight limits of lifting equipment.

DSA1.15.8 M training of staff members in the use of lifting equipment.

DSA 1.16 Safety practices are in place for ultrasound and echocardiography to prevent staff injuries.

DSA1.16.1 Schedule/workload reviews are performed to assess and maintain acceptable allocated examination times for routine and complex examinations.

DSA1.16.2 A liaison is established with an occupational health resource to provide guidance regarding prevention of repetitive stress injuries for individual sonographers.

For Ultrasound and Echocardiography there are mechanisms in place to prevent staff from assuming postures that could result in musculo-skeletal injuries that include:

DSA1.16.3 properly designed scanning chairs

DSA1.16.4 height adjustable stretchers

DSA1.16.5 support cushions

DSA1.16.6 transducer cable supports

DSA1.16.7 foot rests are adjustable

APPROPRIATE PHYSICAL ENVIRONMENT

DSA 2.0 The design and layout of the physical space allows service delivery to be safe, efficient and accessible for patients, visitors and staff.

DSA 2.1 The design and layout of the physical space meets laws, regulations and codes.

DSA2.1.1 Inspections by external authorities (e.g. Fire Marshall, WorkSafe BC, building Inspections) are performed.

DSA2.1.2 Records of inspections and any issued orders are maintained for three years.
Guidance: New facilities should maintain a copy of the occupancy permit as issued by a building inspector.

DSA2.1.3 M Emergency exit routes are marked and provide unimpeded exit.

DSA 2.2 The location of the imaging service is accessible and appropriate to the patient population it serves.

DSA2.2.1 Clear signage is in place to direct patients to the imaging service.

DSA2.2.2 Patients with special needs can access the location with ease.
The physical environment meets patient needs.

- **DSA 2.3**
  - **DSA2.3.1** M Patient areas are safe, clean and private.
  - **DSA2.3.2** M A secure and private location for changing clothing and for the temporary storage of personal items is available.
  - **DSA2.3.3** Temperature, humidity, lighting, noise level and air quality are sufficient for patient comfort.
  - **DSA2.3.4** Patient washrooms are clean, conveniently located and accessible.
  - **DSA2.3.5** Furniture is safe for patient use.

The design and layout of the space allows for patient privacy and confidentiality.

- **DSA 2.4**
  - **DSA2.4.1** Confidential or sensitive information is collected from and communicated to patients in an area that does not compromise their privacy.
  - **DSA2.4.2** M Patient information cannot be viewed by other patients or visitors.
  - **DSA2.4.3** Telephone consultations involving the exchange of patient information are conducted in a private location so other patients and staff cannot overhear the discussions.
  - **DSA2.4.4** M Patient privacy is not compromised during the diagnostic procedure.

The design and layout of the space supports safe and appropriate service delivery.

- **DSA 2.5**
  - **DSA2.5.2**
  - **DSA2.5.3** work surfaces.
  - **DSA2.5.4** floor finishes.
  - **DSA2.5.5** There is sufficient space to allow unobstructed movement and safe working conditions.
  - **DSA2.5.6** There is adequate space surrounding large pieces of equipment to enable unobstructed access for maintenance personnel.
  - **DSA2.5.7** M Activity, workspace and equipment is designed or positioned to reduce the risks of ergonomic distress disorders and accidents.

*Guidance: If workers experience symptoms indicating a musculo-skeletal injury, the employer must investigate and make appropriate changes to the work area. This might be ergonomically designed chairs, anti-fatigue mats for staff that must stand for most of the work day. The employer must have conducted a risk assessment for the potential for musculo-skeletal injury that will include handling of patients who are heavy or have restricted ability to move or the use of awkwardly placed controls on equipment. Controls, including equipment and training, must have been put in place to address all the identified moderate or high risk situations. WorkSafe BC has two worksheets ("A" and "B") in the publications section of the website, which provide a template for conducting the risk identification and assessment. These worksheets can be found at www2.worksafebc.com/pdfs/Ergonomics/MSIWorksheet_A.pdf and www2.worksafebc.com/pdfs/Ergonomics/MSIWorksheet_B.pdf.*

(Note: these are not clickable links but can be typed into the address bar)
DSA2.5.10  M □ Security measures are in place relative to the threat of theft and tampering with biological agents, samples, drugs, chemicals and confidential information. 
Guidance: Locks may be required for doors to restrict access. Additional security measures such as locked areas, limited access to specific personnel, etc. may be required for hazardous areas. The threat of theft or tampering should be assessed, and based upon that assessment, appropriate security measures are implemented.

DSA2.5.11  A secure and private location for changing clothing is available to staff.

DSA2.5.12  M □ A location is available for secure storage of staff personal belongings.

DSA2.5.13  Washrooms are conveniently located and separate from patient washrooms. 
Guidance: WorkSafe BC guideline G4.85(1) recommends that separate male and female washrooms are provided when there are more than 9 workers.

DSA2.5.15  M □ Storage and consumption of food and beverages is permitted in designated areas only.

DSA 2.6  Sinks and eyewashes are available to staff.
There are dedicated hand washing sinks:

DSA2.6.1  M □ located in areas where biological materials are handled.

DSA2.6.2  M □ clearly labeled as appropriate for hand washing.

DSA2.6.3  M □ with unimpeded drainage (e.g. not stoppers).

DSA2.6.4  M □ with unimpeded access.
Guidance: To protect staff, it is necessary to provide access to a sink suitable for cleaning their hands. If there is only one sink available and that sink may also be used for disposal of chemicals or biological samples, then there must be either a process to clean the sink prior to using the sink for hand washing; or a sanitizing gel must be made available to staff to use followed by hand washing at the nearest available clean sink. Unimpeded access means that staff would always be able to access the sink. As an example, a sink located in a washroom is not considered as having unimpeded access.

DSA2.6.5  M □ Eyewash stations are conveniently located and regularly flushed.
Guidance: Emergency eyewash stations must provide a minimum of 15 minute supply of tempered water. Consult with WorkSafe BC to determine the type of eyewash station required based upon the corrosives and/or irritants used in the imaging service.

DSA 2.7  Lighting, temperature and ventilation is appropriate.

DSA2.7.1  M □ Lighting provides sufficient illumination for safe working.

DSA2.7.2  M □ Emergency lighting is available in the event of power failure.
Guidance: Occupational Health and Safety Regulation (section 4.69) and the BC Fire Code (section 6.8) have detailed requirements. An emergency lighting system must "provide dependable illumination...... to enable all emergency measures to be carried out - including evacuation of workers" Emergency lighting units must be tested regularly (e.g. monthly) for effective function.
ACCREDITATION STANDARDS
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DSA2.7.3  □ Ambient temperature and humidity is controlled to a level compatible with staff comfort and that does not compromise diagnostic procedures/processes in each area of the imaging service.

Guidance: Temperature and humidity concerns are addressed in the ASHRAE publication Handbook of Fundamentals or in the WorkSafe BC publication Indoor Air Quality that may be accessed from the website www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/indoor_air_bk89.pdf.

DSA2.7.4  □ Air flow is monitored to ensure adequate ventilation.

Guidance: The monitoring of air flow (e.g. # of air changes per hour) may be a responsibility of the facility management and may not necessary be conducted by the imaging service.

DSA2.7.5  □ Ventilation ducts should be isolated from the general workspace in order to avoid dispersion of airborne infections agents or odours in the rest of the workplace.


DISASTER AND EMERGENCY PREPAREDNESS

Introduction: Disaster and emergency preparedness examines how the imaging service plans to respond to disasters. A disaster may be internal to the imaging service such as a flood, fire, or loss of electrical power; or the disaster may be a community wide disaster such as an earthquake.

DSA 3.0  □ The imaging service is prepared for disasters and emergencies.

DSA 3.1  □ There is a disaster and emergency preparedness plan that addresses a response to an emergency.

DSA3.1.1  □ The role and capability of the imaging service during a disaster or emergency is identified.

The plan for response to disasters and emergencies includes, but is not limited to:

- □ a staff recall system.
- □ access to first aid equipment.
- □ alternate service sites if needed.
- □ alternate sources of supplies, utilities and communication.

DSA 3.2  □ The disaster and emergency response plan is regularly reviewed to ensure it is valid and updated.

DSA3.2.1  □ Disaster and emergency plans are reviewed with all staff and they are aware of their roles and responsibilities in the event the plan is implemented.

DSA3.2.2  □ The plan has been tested by monitoring the effectiveness of the practice drills and making changes to plans, procedures and training methods, if necessary.

DSA3.2.3  □ Contact names and phone numbers on fan-out lists are current.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:

Diagnostic Accreditation Program Accreditation Standards 2007. British Columbia, Canada


Occupational Health and Safety Regulations of British Columbia.

WorkSafe BC publications accessible through www.worksafebc.com/publications.

RADIATION SAFETY

Introduction:
When using imaging equipment involving ionizing radiation there are four main aspects of radiation protection and safety to be considered. First, patients are not to be subjected to unnecessary procedures. This means that the procedures are requested with justification, including clinical examination, and when the diagnostic information cannot be obtained otherwise. Second, when a procedure is required, it is essential that the patient be protected from excessive radiation exposure during the examination. Third, it is necessary that personnel within the facility be protected from excessive exposure to radiation during the course of their work. Finally, personnel and the general public in the vicinity of such facilities require adequate protection. In all facilities and for all equipment types, procedures are in place in order to ensure that exposures to patients, staff and the public are kept as low as reasonably achievable (the ALARA principle).

A conscious effort must always be made to reduce patient doses to the lowest practical level consistent with optimal quality of diagnostic information. Through close cooperation between medical professionals, technologists, medical physicists, and other support staff it is possible to achieve an effective radiation protection program and maintain a high quality imaging service.

The Radiation Safety section of the accreditation standards addresses:
- Minimizing radiation exposure to staff and visitors
- Minimizing radiation exposure to patients
- Equipment requirements
- Radiation protection surveys – Radiology and Computed Tomography (CT)
- Facility requirements
- Facility requirements – Radiology and CT
- Responsibility of personnel – Radiology and CT

Definitions:

Mobile equipment means, with respect to diagnostic X-ray equipment, equipment that is moved between incidents of use. In the context of these Accreditation Standards, mobile equipment can be further defined as portable equipment affixed with wheels for mobile application.

Radiographic equipment means diagnostic X-ray equipment that implements a technique in which the information contained in the X-ray pattern is obtained, recorded and optionally processed.
Mammography or mammographic equipment means diagnostic X-ray equipment that is used for the examination of breast tissue.

Radioscopic equipment means diagnostic X-ray equipment that implements a technique in which continuous or periodic sequences of X-ray patterns are produced and simultaneously and continuously displayed in the form of visible images. Fluoroscopic equipment is another commonly used term and includes Radio Fluoroscopy, Fluoroscopy, and C-Arm equipment.

The term medical X-ray equipment refers to any or all of the different types of diagnostic X-ray equipment such as mobile, radiographic, radioscopic, and mammographic equipment.

**MINIMIZING RADIATION EXPOSURE TO STAFF AND VISITORS**

**RS 1.0** Appropriate measures are in place to prevent unnecessary radiation exposure to staff and visitors.

*Intent:* To achieve optimal safety, responsible users, radiation safety officers, and equipment operators are to make every reasonable effort to keep exposures to themselves and to other personnel as far below the limits for Occupational Ionizing Radiation Exposures (Reference: Health Canada Safety Code 35, Appendix I, Dose Limits for Occupational Ionizing Radiation Exposures) as reasonably achievable. The activities outlined in this section are primarily directed toward occupational health protection. However, adherence to these activities will also, in many instances, provide radiation protection to visitors and other individuals in the vicinity of the facility.

**RS 1.1** Imaging staff is aware of the risks of ionizing radiation and manage the risks appropriately.

*Intent:* Staff is to be knowledgeable of the hazards of ionizing radiation. The ALARA principle is understood and followed by all imaging staff.

- **RS1.1.1** M An X-ray room is not used for more than one radiological investigation simultaneously.
- **RS1.1.2** M Except for those individuals whose presence is essential, all individuals leave the room when the irradiation is carried out.
- **RS1.1.3** M Direct radiation exposure of staff by the primary beam is not allowed.
- **RS1.1.4** M Deliberate irradiation of an individual for training purposes or equipment evaluation is not permitted.
- **RS1.1.5** M The operator has a clear view of the patient during every X-ray examination and is able to communicate with the patient and/or attendants without leaving the control booth.
- **RS1.1.6** M Personnel use available personal protective devices.

*See also Radiation Safety Accreditation Standards, RS 4.3.*

- **RS1.1.7** M Policies and procedures are in place to protect pregnant staff.

*Guidance: Refer to Occupational Health and Safety Regulation (WorkSafeBC) section 7.21 Reproductive hazards and HCSC 35, Procedures for minimizing radiation exposure to personnel section 2.2.1.9.*
RS1.1.8  M □ Written guidelines are in place for individuals assisting the patient (e.g. holding or assisting during examinations).

*Intent: If parents, attendants or other personnel are called to assist, they are provided with personal protective equipment, and positioned so as to avoid the X-ray beam. No person is to regularly perform these duties.

RS1.1.9  M □ All entrance doors to an X-ray room are closed while making an X-ray exposure. For CT scanners, this includes closing the control room door during the exposure.

RS1.1.10 M □ X-ray machines which are energized and ready to produce radiation are not left unattended.

RS1.1.11 M □ There is documentation to support how the facility identifies and deals with the hazards associated with ionizing radiation.  

*Guidance: Refer to Occupational Health and Safety Regulation (WorkSafeBC) section 5.54(2), Exposure Control Plan.

RS 1.2  Radiation exposure to staff is monitored through the use of personal dosimeters.

RS1.2.1 M □ All operators of X-ray equipment, together with personnel (e.g. nurses) who routinely participate in radiological procedures and others likely to receive a radiation dose in excess of 1/20th (action level) of the dose limit to radiation workers specified are declared radiation workers and their radiation exposures are monitored with the use of a personal dosimeter.

RS1.2.2 M □ Personal dosimeters are worn and stored according to the recommendations of the dosimetry service provider.

RS1.2.3 M □ When a protective apron is worn, the personal dosimeter is worn under the apron.

RS1.2.4 M □ If extremities are likely to be exposed to significantly higher doses; additional dosimeters are worn at those locations on the body.

RS1.2.5 M □ Employees return personal dosimeters to the employer for submission to the dosimetry service provider for analysis.

*Note: It is the responsibility of the dosimetry service provider to submit the results to the National Dose Registry (Health Canada), as well as to the employer.

RS1.2.6 M □ Results of personal dosimeters are reviewed and monitored by a radiation safety officer or designate on a regular basis.

RS1.2.7 M □ An investigation is initiated when a high reading is reported.

*Guidance: A reading higher than usually recorded.

RS1.2.8 □ Results are posted in the imaging service.

RS 1.3  Radiation warning signage is clearly visible to alert patients, staff and visitors of the risks associated with radiation.

*See also Radiation Safety Accreditation Standard RS 6.3 for the requirements for room design and layout.

RS1.3.1 M □ Rooms with stationary X-ray equipment are identified with warning signs incorporating the X-ray warning symbol.
The X-ray warning symbol:

RS 1.3.2 M ☐ is displayed in two contrasting colors.
RS 1.3.3 M ☐ is legible from a distance.
RS 1.3.4 M ☐ bears the words “CAUTION: X-RAYS—ATTENTION: RAYONS X”.

RS 1.3.5 M ☐ Rooms with stationary X-ray equipment, which can be accessed from public areas, are identified with signage stating “Unauthorized Entry Prohibited”.

Intent: If no restricted access signs are in the immediate area of an X-ray room, then signage stating “Unauthorized Entry Prohibited” are also affixed to the X-ray room door to ensure no individual inadvertently enters the room during exposure.

RS 1.3.6 M ☐ Rooms with stationary X-ray equipment that can be accessed from public areas are equipped with a self-closing door.

RS 1.4 Mobile radiographic equipment is safely operated.

Intent: Radiation protection practices are in place to protect the operator and any other individuals in the vicinity of the patient. The X-ray beam is to be directed away from occupied areas, if at all possible, and every effort is made to ensure the beam does not irradiate any other persons in the vicinity of the patient. The operator is not to stand in the direction of the X-ray beam and is a sufficient distance from the X-ray tube.

RS 1.4.1 M ☐ Mobile units are used only if the condition of the patient is such as to make it inadvisable for the examination to be carried out with a stationary unit in the main X-ray department.

RS 1.4.2 M ☐ Mobile X-ray equipment is not utilized as a stationary X-ray unit unless in special circumstances.

Guidance: Special circumstances or exceptions include the following; utilizing a mobile X-ray machine as a replacement when there is stationary equipment failure; when continuance of a radiography service is necessary during X-ray room closures due to renovations; and for a limited scope of practice where grids and higher mAs and KVP’s are not required (e.g. extremities). Any of these exceptions for use of mobile X-ray equipment as a stationary X-ray until must include approval and an approved scope of practice defined by the medical leader.

RS 1.4.3 M ☐ Mobile X-ray equipment utilized as a stationary unit must receive approval from the Diagnostic Accreditation Program (DAP) Committee.

RS 1.4.4 M ☐ In a capacitor discharge unit, the residual charge is fully discharged before the unit is left unattended.

Intent: In a capacitor discharge unit, after an X-ray irradiation has been made, there is a residual charge left in the capacitors. The residual charge can give rise to a “dark current” and result in X-ray emission even though the irradiation switch is not activated.

RS 1.5 Radiographic equipment is safely operated.

RS 1.5.1 M ☐ In the case of special techniques where the operator is required to control the irradiation while at the side of the patient, appropriate protective clothing, in accordance with the requirements of RS 4.3 is worn.

RS 1.5.2 M ☐ Radiographic cassettes are never held by hand during an irradiation.
RS 1.6  Radioscopic equipment is safely operated.

Guidance: For each type of radioscopic procedure, an assessment is to be made of the physical positions of all personnel to ensure ease of operation of the equipment, visibility of the display, and protection from the radiation field.

RS1.6.1 □ Mobile radioscopic units (C-arms) are used for examinations where it is impractical to transfer the patient to a permanent fluoroscopic installation.

RS1.6.2 □ All individuals, with the possible exception of the patient, required being in the room during radioscopy and spotfilm operation associated with the radioscopic operation wear protective aprons.

Intent: Lead shields or curtains mounted on the radioscopic unit are not a sufficient substitute for the wearing of personal protective clothing such as lead aprons.

RS1.6.3 □ Protective gloves are worn by the radiologist during palpation in every radioscopic examination.

Guidance: Health Canada Safety Code 35 has not required this as a mandatory activity; however, it is highly recommended that protective gloves be worn during palpation.

RS 1.7  Staff members performing angiography examinations are aware of the risks of ionizing radiation and manage the risks appropriately.

Intent: Angiography is potentially one of the greatest sources of exposure to personnel in radiology since it requires the presence of a considerable number of personnel close to the patient, radioscopy for extended periods of time and multiple radiographic exposures. For such procedures, all personnel are to be aware of the radiation hazards involved.

See also Radiation Safety Accreditation Standard RS 1.6.

RS1.7.1 □ Protective thyroid shields with an equivalent of 0.50 mm lead (Pb) are used.

RS1.7.2 □ Leaded glasses are used.

Intent: In the situation where scatter radiation to the lenses of eye could approach the annual equivalent dose limit of 150 mSv, leaded glasses are recommended.

RS1.7.3 □ All staff not required to be immediately adjacent to the patient during the procedure stand back as far as possible from the patient, while still able to effectively carry out their duties and, if at all possible, stands behind a protective shield.

RS1.7.4 □ Full use of the protective devices provided with X-ray equipment such as shielded panels, drapes, bucky slot covers, ceiling-suspended lead acrylic screens, etc. are used.

RS1.7.5 □ Special shields in addition to the protective devices provided with the machine are used.
MINIMIZING RADIATION EXPOSURE TO PATIENTS

RS 2.0 Appropriate measures are in place to prevent unnecessary radiation exposure to patients.

Reference HCSC35, Section 3.0 Procedures for Minimizing Radiation Exposure to Patients and Section 3.1 guidelines for the Prescriptions of X-ray Examinations.

Intent: Procedures to minimize radiation exposure to patients are the responsibility of the physician/practitioner, radiologist and technologist. These standards provide guidance for the elimination of unnecessary examinations and for minimizing doses to patients when examinations are necessary.

RS 2.1 Mechanisms are in place to prevent unnecessary radiation to patients.

Intent: Unnecessary radiation exposures of patients can be significantly reduced by ensuring that all examinations are clinically justified. The request for an X-ray examination of a patient is to be based on clinical evaluation of the patient and is for the purpose of obtaining diagnostic information or patient treatment. Examinations are only performed when requested by an authorized individual. More specific guidance for the prescription of imaging examinations is available from the Canadian Association of Radiologists (CAR) in their Diagnostic Imaging Referral Guidelines (CAR 2005). These guidelines provide recommendations on the appropriateness of imaging investigations for the purpose of clinical diagnosis and management of specific clinical/diagnostic problems.

RS2.1.1 M □ There is signage posted, at a minimum, in the reception and patient changing/waiting areas that is clearly visible to alert women who may be pregnant to notify the technologist.

RS2.1.2 M □ The operator does not perform any examination which has not been requested by an authorized individual.

RS2.1.3 M □ Shielding is used where appropriate and practicable to limit the exposure of body tissues and when clinical objectives will not be compromised.

Intent: It is particularly important to protect sensitive body tissues and children. Appropriate use of specific area gonad shielding is advised when: the gonads lie within, or are in close proximity to, the X-ray beam; the patient is of reproductive age; and clinical objectives will not be compromised. Gonad shields are of sufficient size and shape to exclude the gonads completely from primary beam irradiation. Note: For CT breast shields, using some vendor scanners may increase patient dose. It is recommended to consult with manufacturers on the use of breast shielding.

RS2.1.4 M □ The X-ray beam is well-collimated to restrict the beam as much as is practicable to the area of diagnostic interest.

RS2.1.5 M □ Infant immobilizers are available for pediatric imaging.
RS 2.2  Procedures are in place to protect female patients of childbearing age.

**Intent:** Only essential investigations are taken in the case of pregnant or suspected pregnant women. Care is taken to protect the fetus from radiation when the X-ray examination of pregnant women is unavoidable. This includes keeping the exposure to the absolute minimum, the use of shielding of the abdominal area and the use of a well-collimated X-ray beam.

RS2.2.1  Before performing X-ray examinations on females of child bearing age (11-55 years), the patient is asked whether there is any chance that they may be pregnant.

RS2.2.2  If an examination is requested on a pregnant or potentially pregnant patient, there are documented procedures on how to proceed with the examination request.

When radiological examinations of the pelvic area or abdomen are required:

RS2.2.3  the exposure is kept to the absolute minimum.

RS2.2.4  full use is made of gonadal shielding and other protective shielding if the clinical objectives of the examination will not be compromised.

RS 2.3  Procedures are in place to minimize radiation exposure to patients during *radioscopic* procedures.

RS2.3.1  Radioscopy is not used as a substitute for radiography.

**Intent:** In view of the relatively high exposure that results from radioscopy, such procedures are only carried out when an equivalent result cannot be obtained from radiography. All radioscopy procedures are carried out as rapidly as possible with the minimum dose rates and smallest practical X-ray field sizes.

RS2.3.2  During exposures, the operator has a clear line of sight to the output display at all times.

RS2.3.3  Mobile radioscopy equipment is only used for examinations where it is impractical to transfer patients to a permanent radioscopy installation.

RS2.3.4  Cinefluorography technique is not used unless significant medical benefit is expected.

**Intent:** Cinefluorography produces the highest patient doses in diagnostic radiography because the X-ray tube voltage and current used are generally higher than those used in radioscopy.

RS 2.4  Procedures are in place to minimize radiation exposure to patients during *angiography* procedures.

RS2.4.1  Where it does not interfere with the diagnostic information sought, appropriate shielding is used to protect patient’s eye and thyroid.

**Intent:** Exposure to the patient’s eyes and thyroid can result during neurological examinations, such as cerebral angiography and cardiac catheterization and angiography. The technique of the procedure takes into consideration the risk to the eyes and thyroid.
RS  3.0  Patient radiation dose is effectively managed.

Definitions:
Diagnostic Reference Levels (DRL’s) are NOT dose limits, but are constraints, which should be used to assess patient dose. Ideally the quantity of radiation used for an examination should be just enough to provide adequate images so that a diagnosis can be made. However, this is very difficult to achieve in practice. In general, what is much easier to determine is what procedures use an unacceptable amount of radiation. This is usually performed by measuring doses for a given examination over a region or country. This always results in a fairly wide distribution of doses. In general it is considered that the highest 25% doses are unacceptable, so the 75% level is set as the Diagnostic Reference Level or the Reference Dose.

RS  3.1  Mechanisms are in place to manage patient radiation dose.

RS3.1.1  Mechanisms are in place to determine when excessive radiation doses for angiography procedures are recorded and when notification and guidance to medical practitioners and patients is required.

Guidance: Any unusually high radiation doses (e.g. dose indicator values) are investigated by a medical physicist as necessary. Cases of excessive radiation dose should include a decision to consult with the patient and medical practitioner to provide guidance so that a possible effect is conservatively and proactively treated. There is documentation in the medical record of the dose and the details of communication with the physician and patient regarding the excessive dose and the nature of problems and associated risks.

RS3.1.2  All new radiosopic and radiographic equipment can record patient dose in the form of the dose-area product (Dose AP).

RS  3.2  Diagnostic Reference Levels (DRL’s) are referenced to optimize patient dose.

RS3.2.1  For CT, Dose-Length Product (DLP) values are compared to published DRL’s and techniques are optimized accordingly.

RS3.2.2  For angiography, DAP values are compared to published DRL’s and techniques are optimized accordingly.

RS3.2.3  For radiography, DAP values are compared to published DRL’s and techniques are optimized accordingly.

Intent: Dose indicators for some radiographic X-ray equipment may also be available, and those facilities are encouraged to reference DRL’s and optimize techniques.
EQUIPMENT REQUIREMENTS

RS 4.0   Equipment is maintained and monitored in a manner that ensures performance specifications and radiation safety are met.

RS 4.1   All new, used, and refurbished medical X-ray equipment conforms to Health Canada regulatory requirements.

Intent: Whenever possible, existing medical X-ray equipment is upgraded to incorporate as many as possible of the safety and performance features required of new medical X-ray equipment, as specified in the Radiation Emitting Devices (RED) Regulations in effect at that time. It is noted that it is a requirement of the Radiation Emitting Devices Act that replacements for any component or subassembly of an X-ray machine, for which a construction or performance standard has been specified in the Regulations applicable to the class of X-ray equipment, comply with the standards in effect at the time of replacement.

RS4.1.1   M □ At time of purchase, all new, used and refurbished medical X-ray equipment conforms to the Radiation Emitting Devices Regulations. ¹

Guidance: As part of acceptance testing procedures there is verification of compliance to RED regulations for diagnostic X-ray equipment, Part XII. Note: Only a few of many important regulations are listed below.

Radiographic systems have:

RS4.1.2   M □ an irradiation switch that requires continuous pressure by the operator to emit X-rays.

Radioscopic systems have:

RS4.1.3   M □ an irradiation switch that requires continuous pressure by the operator for the entire period of any irradiation and enables the operator to terminate the recording of serial radioscopic images at any time.

RS4.1.4   M □ visual indicators that continuously display the X-ray tube voltage and the X-ray tube current.

RS4.1.5   M □ an X-ray image intensifier that includes protective shielding such that for any focal spot to image receptor distance, the entire cross section of the X-ray beam is intercepted within the primary protective shielding. Also, the radioscopic X-ray tube is not capable of emitting X-rays unless the protective shielding is in place to intercept the X-ray beam.

RS4.1.6   M □ a high-level irradiation control is activated by a separate means that requires continuous pressure by the operator to emit X-rays. An audible signal is emitted when the high-level irradiation control is in use.

RS4.1.7   M □ a device that limits the focal spot to skin distance.

Guidance: The focal spot to skin distance is not less than 30 cm for mobile equipment, 38 cm for stationary equipment, 20 cm for radioscopic equipment designed for special applications that would be impossible at 30 cm or 38 cm. In the case of small-format, low-intensity radioscopic equipment, the minimum focal spot to skin distance is the distance at which the equipment is capable of delivering an air kerma rate of 50 mGy/min.
RS4.1.8  M  a last image hold system which keeps on display the last radioscopic image obtained.

CT systems ensure:

RS4.1.9  M  initiation or continuation of irradiation is possible only from the control panel.
RS4.1.10 M  an emergency stop switch is in place on or near the patient support and/or gantry to immediately terminate the motion of the equipment and the emission of X-rays.
RS4.1.11 M  a minimum focal spot to skin distance of at least 15 cm.

RS4.1.12 M  At time of purchase, all new, used and refurbished medical X-ray equipment conforms to the Medical Devices Regulations. Guidance: All equipment has an active Health Canada medical device licensing number.

RS4.1.13 M  When purchasing a Computed Radiography (CR) system for a new or existing X-ray system or an after market DR detector to be installed on an existing system, both CR and Digital Radiography (DR) systems meet the requirements of the Radiation Emitting Devices Act and Regulations, as well as the Food and Drug Act and the Medical Devices Regulations.

RS4.1.14 M  The existing X-ray system, onto which a CR or DR systems is retrofitted, meets the current requirements of Part XII of the Radiation Emitting Devices Regulations.

RS4.1.15 M  CR and DR image receptors are only installed on X-ray systems which have an automatic means of controlling exposures, such as an automatic exposure control.

RS4.1.16 M  The digital system is calibrated to correctly reflect the sensitivity of the digital receptor.

RS  4.2  New and replaced medical X-ray equipment is registered with the Diagnostic Accreditation Program of BC and includes the following information:

RS4.2.1 M  facility name and address.
RS4.2.2 M  name of owner.
RS4.2.3 M  name of Radiation Safety Officer/individual responsible for radiation safety.
RS4.2.4 M  room name or number.
RS4.2.5 M  type of equipment.
RS4.2.6 M  manufacturer.
RS4.2.7 M  year of manufacture.
RS4.2.8 M  model.
RS4.2.9 M  device master serial number.
RS4.2.10 M  tube 1 insert number.
RS4.2.11 M  tube 2 insert number (if applicable).
RS4.2.12 M  date of installation.
Personal protective equipment provides protection to patients, staff and visitors. See also Equipment and Supplies Accreditation Standard DES 3.10.

Protective lead aprons provide attenuation equivalent to at least:

- **RS4.3.1** M 0.25 mm of lead, for examinations where the peak X-ray tube voltage is 100 kV or less.
- **RS4.3.2** M 0.35 mm of lead, for examinations where the peak X-ray tube voltage is greater than 100 kV and less than 150 kV
- **RS4.3.3** M 0.5 mm of lead, for examinations where the peak X-ray tube voltages is 150 kV or greater.
- **RS4.3.4** 0.50 mm Pb in the front panels and 0.25 mm Pb in the back are recommended for full wrap around type aprons used for interventional procedures.

RS4.3.5 M Protective gonad shields for patients have a lead equivalent of at least 0.25 mm Pb. Guidance: At a higher kilovoltage (e.g. 150KVP) it is recommended that gonad shields for patients have a lead equivalent thickness of 0.5 mm.

RS4.3.6 M Protective gloves possess at least a 0.25 mm Pb equivalency.
  Guidance: These protections are provided throughout the glove, including fingers and wrist.

RS4.3.7 M The lead equivalent thickness of the protective material used is permanently and clearly marked on all protective equipment and apparel.

RS4.3.8 M The attenuation value is marked on all protective screens and shields.

RS4.3.9 M Ceiling-mounted lead acrylic screens and moveable shields provide protection equivalent to at least 0.50 mm Pb.

RS4.3.10 M Protective equipment is stored and maintained according to manufacturers’ recommendations.

**RADIATION PROTECTION SURVEYS – RADIOLOGY and CT**

**RS 5.0** An evaluation of the radiation safety of the facility is conducted at appropriate frequencies.

*Intent:* A radiation protection survey is an evaluation, conducted by an expert, of the radiation safety of a radiological facility. The survey is intended to demonstrate that the X-ray and auxiliary equipment function properly and according to applicable standards, and that the equipment is installed and used in a way which provides maximum radiation safety for operators, patients and others. Safety measures such as protective equipment and shielding are also examined to ensure that they are present and provide the required protection. It is important, therefore, that X-ray facilities are inspected at regular intervals. Surveys are conducted for new installations and after any changes are made to an existing installation, which might produce a radiation hazard. This includes alteration of protective barriers, equipment modification and replacement, changes in operating procedures, or increased workloads.
Routine operation of any new installation or an installation which has undergone modifications is deferred until a complete survey has been made by an expert. The expert is an individual who is qualified by education and experience to perform advanced or complex procedures in radiation protection that generally are beyond the capabilities of most personnel within the facility. These procedures include evaluation of the facility design to ensure adequate shielding is in place, inspection and evaluation of the performance of X-ray equipment and accessories, and evaluation and recommendation of radiation protection programs. In all cases, the radiation protection survey is intended to determine the extent of any damage to the equipment or the facility; thus it is part of an incident investigation.

**RS 5.1 Radiation protection surveys are conducted to assess safety when:**

**RSS.1.1**  
M ☐ there is a new installation.  
*Guidance: Full acceptance testing will also be performed. See also modality-specific accreditation standards.*  
*Intent: For a new facility, it is particularly advantageous to make visual inspections during construction, to ensure compliance with specifications and to identify faulty material or workmanship, since deficiencies can be remedied more economically at this stage than later. Such inspections include determination of thickness of lead and/or concrete thickness and density, degree of overlap between lead sheets or between lead and other barriers, as well as thickness and density of leaded glass used in viewing windows.*

**RSS.1.2**  
M ☐ existing equipment is relocated.  
*Guidance: Full acceptance testing will also be performed. See also modality-specific accreditation standards. Exempt from this requirement is equipment that is designed to be mobile, such as a portable X-ray unit; a radiation survey is not required every time mobile equipment is moved.*

**RSS.1.3**  
M ☐ equipment is damaged or modified.  
*Guidance: For repairs, upgrades and modifications, tests on those areas of the equipment where the performance may have been affected are carried out. For example, replacing an X-ray tube would require the characteristics of the new tube to be measured (e.g. kVp accuracy, mAs linearity, HVL, focal spot size and collimation).*

**RSS.1.4**  
M ☐ there is an indication of an unusually high exposure of a worker to ionizing radiation.

**RSS.1.5**  
M ☐ the interval between radiation protection surveys is more than three years.  
*Guidance: Radiation protection surveys are carried out at regularly scheduled intervals during routine operations to detect problems due to equipment failure or any long-term trends toward a decrease in the level of radiation safety.*
The radiation protection survey report provides results and recommendations based on the surveyors findings.

Guidance: The survey report presents in a clear systematic way the details and results of the measurements carried out, as well as the conclusions drawn and recommendations made by the surveyor. Any unusual findings about the equipment itself, the facility or operating procedures, which could affect the safety of operators or other persons in the vicinity of the X-ray facility, are clearly identified.

RS 5.2.1 M □ Surveyors are qualified by education and experience to perform advanced or complex procedures in radiation protection.

The survey report includes:

RS 5.2.2 M □ a sketch of the facility, showing the location of the X-ray equipment and control booth within the facility as well as identifying the nature and occupancy of the areas adjoining the facility.

RS 5.2.3 M □ identification of the X-ray equipment (i.e., the name of the manufacturer, model designation and serial number of the generator, control, X-ray tube assembly, X-ray table, etc. as applicable) and the date, or at least approximate date manufactured.

RS 5.2.4 M □ an indication of the method of support of the X-ray tube assembly (i.e., floor-to-ceiling tube stand, ceiling suspended over-table tube, etc.).

RS 5.2.5 M □ observations made of the operational conditions (both electrical and mechanical) of the X-ray equipment at the time of the survey.

RS 5.2.6 M □ the actual or estimated total workload of the facility, as well as the workload apportioned into various X-ray beam directions and procedures used, etc.

RS 5.2.7 M □ results of radiation measurements carried out both inside and outside the controlled area under “typical” operating conditions and the locations at which the measurements are made. See also Radiation Safety Accreditation Standards RS 6.1.1 and 6.1.2.

RS 5.2.8 M □ an assessment of the condition of patient restraints, protective aprons, gloves, mobile protective barriers and other protective devices.

RS 5.2.9 M □ an indication of the estimate of potential exposures to personnel and general public in or around the facility.

RS 5.2.10 M □ an evaluation of the X-ray performance and the imaging or diagnostic performance (this may include performing applicable acceptance testing or quality control tests, e.g. new and relocated equipment has acceptance testing performed.).

RS 5.2.11 M □ a summary of typical loading factors (e.g. protocols)

RS 5.2.12 M □ an assessment of the system in place to monitor patient doses and optimize doses according to Diagnostic Reference Levels.

RS 5.2.13 M □ results of investigations of any unusually high exposures from previous personnel dosimetry reports and recommendations on whether other persons are to be included in the personnel dosimetry service.

RS 5.2.14 M □ a review of the facility’s quality assurance program to ensure it exists and is maintained, including quality control testing records.

RS 5.2.15 M □ recommending when there is a need for a follow-up survey.

RS 5.2.16 M □ The results of surveys including conclusions drawn by the expert are submitted to the owner or responsible user in a written report.
FACILITY REQUIREMENTS

Note: For mammography facilities, see also Mammography Accreditation Standard MAES 1.2 for information regarding the requirement for an annual mammography medical physicist assessment and report.

Additional references:
- Health Canada Safety Code 33, Section 4 Facility, equipment and installation requirements, Section 4.1, 4.1.1 and 4.1.2.
- Radiation Protection Services of BC, Guideline for Determining the X-Ray Shielding Requirements for a Mammographic Facility.

For Bone Densitometry installations, reference: Radiation Protection Services of BC, Radiation Issue Notes, RIN #11, Radiological Safety in the Design and Operation of DEXA Bone Densitometry facilities. Recommendations are available for room design, workstation position and considerations for shielding.

Definitions:

Controlled areas are typically in the immediate areas where X-ray equipment is used such as the procedure room and X-ray control booths. The workers in these areas are primarily equipment operators such as radiologists and radiation technologists who are trained in the proper use of the equipment and in radiation protection. Controlled areas are subject to the limit of 20 mSv per year.

Uncontrolled areas are those occupied by individuals such as patients, visitors to the facility, and employees who do not work routinely with or around radiation sources. Uncontrolled areas are subject to the limit of 1 mSv per year.

Primary protective barriers provide shielding from the direct X-ray beam and therefore are to be placed in such an orientation as to intersect the X-ray beam.

Secondary protective barriers are required to provide shielding from scattered and leakage X-rays.

RS 6.0 Planning activities ensure adequate shielding is in place to provide the necessary level of radiation protection.

Intent: In the planning of any medical X-ray facility the main priority is to ensure that persons in the vicinity of the facility are not exposed to levels of radiation which surpass the current regulatory exposure limits. In the early stages of designing and planning a medical X-ray facility, three steps are taken to ensure adequate shielding is in place to provide the necessary level of radiation protection:
- Preparation of facility plans
- Considerations for room design and layout
- Determination of parameters governing shielding requirements
### ACCREDITATION STANDARDS

#### RADIATION SAFETY

<table>
<thead>
<tr>
<th align="center">RS 6.1</th>
<th align="center"><strong>Appropriate steps are taken to ensure adequate shielding is present in controlled and uncontrolled areas.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="center">RS6.1.1</td>
<td align="center">M □ The radiation levels in controlled areas that are occupied routinely by radiation workers are such that no radiation worker is occupationally exposed to more than 20 mSv per year.</td>
</tr>
<tr>
<td align="center">RS6.1.2</td>
<td align="center">M □ The radiation levels in uncontrolled areas are such that no person receives more than 1mSv per year.</td>
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</tbody>
</table>

#### FACILITY REQUIREMENTS – RADIOLOGY and CT

| RS 6.2 | **Preparation of facility plans includes preparing a facility floor plan.**  
The facility floor plan includes: |
| :--: | :--: |
| RS6.2.1 | M □ The dimensions and shape of the room where the X-ray equipment is operated and the physical orientation of the room (a mark indicating North). |
| RS6.2.2 | M □ The location where the X-ray equipment is planned to be placed and the range of movement of the X-ray tubes. |
| RS6.2.3 | M □ The location of the control booth, if applicable. |
| RS6.2.4 | M □ The location, use, occupancy level and accessibility of adjacent rooms, as well as rooms above and below the facility. |
| RS6.2.5 | M □ The designation of the adjacent rooms, whether to be designated as a controlled or uncontrolled area. |
| RS6.2.6 | M □ The location where image processing is performed, (e.g. location of darkrooms, film storage area, computer workstations) |
| RS6.2.7 | M □ The position of all windows, doors, etc., that may affect radiation protection requirements. |
| RS6.2.8 | M □ The planned and existing materials used to construct the walls, floor, ceiling, and the control booth, and their thicknesses including additional materials currently being used, or planned for use, as radiation shielding barriers. |
| RS6.2.9 | M □ The application of the protective barriers. |

| RS 6.3 | **Radiation safety planning includes considerations for room design and layout.**  
*See also Radiation Safety Accreditation Standards RS 1.3.1-RS1.3.2 for the requirements for radiation warning and restricted access signage.* |
| :--: | :--: |
| RS6.3.1 | M □ Mobile X-ray equipment used routinely in one location is considered as a fixed installation and the shielding needs for the equipment and room are determined accordingly. |
| RS6.3.2 | M □ The rooms containing the X-ray equipment are designed to provide adequate working space for the equipment operator and to allow for ease of patient movement. |
RS6.3.3 □ The X-ray equipment is positioned in the room in such a way that during an irradiation, no one can enter the room without the knowledge of the equipment operator.

Guidance: Health Canada Safety Code 35 has not required this as a mandatory requirement however; it is highly recommended equipment is positioned in such a way that during an irradiation, no one can enter the room without the knowledge of the equipment operator.

RS6.3.4 M □ The X-ray beam is always directed toward adequately shielded areas. Guidance: Particular attention is to be paid to the adequacy of shielding for chest radiography using wall mounted image receptors.

RS6.3.5 M □ A control booth is provided for the protection of the operator, if applicable, for the type of equipment. The control booth, and the viewing window, has shielding properties such that no operator is occupationally exposed to more than 0.4 mSv/week.

Guidance: The control booth is located in an area, whenever possible, such that the radiation has to be scattered at least twice before entering the booth. The ALARA principle requires that additional shielding be specified in the design to further reduce operator exposure, wherever this can reasonably be done. Mobile protective screens are not considered adequate as a control booth for radiological procedures.

RS6.3.6 M □ Shielding is constructed to form an unbroken barrier and if lead is used, it is adequately supported to prevent “creeping”.

RS 6.4 Shielding calculations are performed by trained, knowledgeable individuals.

RS6.4.1 M □ Shielding calculations are performed by trained individuals with current in-depth knowledge of structural shielding design (e.g. knowledge of radiation protection requirements and radiation shielding barriers) and using the acceptable methods of performing these calculations.

RS6.4.2 M □ All shielding plans are reviewed by a third party expert.
RESPONSIBILITY OF PERSONNEL— RADIOLOGY and CT

Introduction:
It is the responsibility of the owner to ensure that the equipment and the facilities in which such equipment is installed and used meet all applicable radiation safety standards, and that a radiation safety program is developed, implemented and maintained for the facility. The owner may delegate this responsibility to competent staff. How this responsibility is delegated will depend upon the number of staff members, the nature of the operation, and on the number of X-ray equipment owned.

Definitions:
The main role of the responsible user is to monitor and manage the radiation safety program of the facility including personnel requirements, equipment performance and safety procedures and to communicate program information with the appropriate staff.

A radiation safety officer (RSO) is the title commonly assigned to a radiation safety specialist who routinely manages a facility’s radiation protection program.

RS 7.0 Responsible staff ensures the optimum level of radiation safety and image quality.

RS 7.1 The radiation safety program is monitored and managed by competent staff.

RS 7.1.1 M The owner ensures that one or more competent individuals are designated to carry out the duties identified in RS 7.2 “responsible user” and RS 7.3 “medical physicist/radiation safety officer”.

RS 7.2 Radiation safety activities are performed by competent staff.

RS 7.2.1 M There is at least one individual designated to perform the duties of “responsible user”.

Guidance: The responsible user can be an owner, licensed physician, technologist or administrator of a facility who is able to demonstrate competency in the duties of a responsible user as listed in RS7.2.2 - RS 7.2.11. The responsible user typically needs to be a person who is stationed on-site; for smaller facilities, an off-site responsible user may be acceptable if the duties are being adequately fulfilled with the assistance of an on-site competent person.

The responsible user ensures that:

RS 7.2.2 M the X-ray equipment, image processing equipment, and ancillary/auxiliary equipment function correctly.

RS 7.2.3 M the equipment is maintained properly by implementing and maintaining an effective imaging quality assurance program for the facility, including quality control testing, establishing diagnostic reference levels, and record keeping.

RS 7.2.4 M equipment is used correctly, and maintained properly, by competent personnel who are properly trained in the safe operation of the equipment.
RS7.2.5  M  inexperienced personnel, including students, operate the equipment only under the direct supervision of a Canadian Association of Medical Radiation Technologists (CAMRT) certified and experienced X-ray equipment operator until competence in a given clinical procedure is achieved, at which time supervision should be indirectly provided by a supervisor available on-site when needed.

The responsible user:

RS7.2.6  M  establishes documented safe operating procedures for the equipment and ensures that operating staff are adequately instructed.

RS7.2.7  M  promulgates documented rules of radiation safety and ensures that staff members are made aware of them through training.

RS7.2.8  M  ensures an investigation is completed of any known or suspected exposures received by personnel that are unusually higher than the usual dose received by that individual, or in excess of 1/20th of the dose limit for radiation workers.

RS7.2.9  M  ensures that radiation levels in controlled and uncontrolled areas are below the maximum permissible limits such that the annual dose limits to radiation workers and the public will not be exceeded.

RS7.2.10  M  ensures that an effective communication system is maintained between X-ray equipment operators, referring physicians, medical physicists/radiation safety officers and information systems specialists to discuss all matters related to radiation protection of patients and workers.

RS7.2.11  M  ensures that the medical physicist/radiation safety officer and all equipment operators are provided with a copy of this Safety Code.

RS  7.3  Radiation protection specialists act as an advisor for all aspects of radiation protection.

RS7.3.1  M  There is a medical physicist or radiation safety officer to act as an advisor on all radiation protection aspects during the initial stages of construction of the facility, installation of the equipment, and during subsequent operations.

Intent: This individual typically needs to be a person who is stationed on-site; some duties can be contracted as required, and some duties can be performed regionally or corporately. A responsible user can also be the RSO. Until a training course for RSO’s in B.C. is readily available, qualifications for an RSO will be established based on the individual’s knowledge of the work, the hazards, and the control measures necessary to perform the duties of a RSO (as listed in RS 7.3.2-RS 7.3.18).

The radiation protection specialist/medical physicist/radiation safety officer:

RS7.3.2  M  assesses the radiation safety of an installation at the time of planning and/or construction of the facility, or when modifications are planned and/or are being made to an existing facility.

Guidance: For some facilities, this is an example of when a contracted service may be applicable.

RS7.3.3  M  registers the equipment with the Diagnostic Accreditation Program when new equipment is purchased or equipment is replaced. See also Radiation Safety Accreditation Standard RS 4.2.
RS7.3.4 M □ establishes periodic scheduled radiation protection inspections for the facility.
RS7.3.5 M □ establishes safe working conditions according to the recommendations of Health Canada Safety Code 35 (HCSC35) and the statutory requirements of federal, provincial, or territorial legislation, where applicable.
RS7.3.6 M □ ensures that established safety procedures are being followed and reports any non-compliance to the responsible user.
RS7.3.7 M □ reviews the safety procedures periodically and updates them to ensure optimum patient and operator safety.
RS7.3.8 M □ instructs X-ray equipment operators and other personnel participating in X-ray procedures in proper radiation protection practices.
RS7.3.9 M □ carries out routine checks of equipment and facility safety features and radiation surveys.
RS7.3.10 M □ ensures that appropriate radiation survey instruments are available, in good working condition, and properly calibrated.
RS7.3.11 M □ keeps records of radiation surveys, including summaries of corrective measures recommended and/or instituted. See also Radiation Safety Accreditation Standard RS 5.2.
RS7.3.12 M □ declares who is to be considered an occupationally exposed person (e.g. personnel who may receive a radiation dose in excess of 1/20th of the recommended dose limit for a radiation worker.).
RS7.3.13 M □ organizes participation in a personnel radiation monitoring service, such as that provided by the National Dosimetry Services, Health Canada.
RS7.3.14 M □ ensures that all occupationally exposed persons wear personal dosimeters during radiological procedures or when occupational exposures are likely.
RS7.3.15 M □ reviews, manages and maintains records of occupational exposures received by personnel.
RS7.3.16 M □ investigates each known or suspected case of excessive or abnormal exposure to patients and staff to determine the cause and to take remedial steps to prevent its recurrence.
RS7.3.17 M □ participates in the establishment of diagnostic reference levels. See also Radiation Safety Accreditation Standard RS 3.2.
RS7.3.18 M □ understands the recommendations and requirements in HCSC35.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


Health Canada Safety Code 35. Note: The contents of Health Canada Safety Code 35 have been adapted to develop the DAP Radiation Safety Accreditation Standards.

SPECIFIC DOCUMENTS REFERENCED


ACCREDITATION STANDARDS 2010

PATIENT SAFETY

Introduction:
Patient safety is fundamental to the delivery of quality diagnostic services and optimal patient outcomes. The term ‘patient safety’ refers to the prevention of adverse outcomes and unsafe acts through the application of best practices. Patient safety applies to all initiatives undertaken by the imaging service to keep patients safe and away from harm through the provision of high quality care and services to promote well-being. Ensuring that the procedures and services provided by the imaging service are provided in a safe manner, and that a continuous effort is made to improve patient safety must be made a strategic priority/goal for all imaging services. Appropriate and sufficient resources should be allocated to support the imaging service’s implementation of the patient safety strategic priority/goal.

The Patient Safety section of the accreditation standards addresses:

- Creating a culture of patient safety
- Patient identification
- The universal protocol
- Medication management and administration
- Risk and disclosure
- Emergency management

CREATING A CULTURE OF PATIENT SAFETY

Introduction:
Creating a culture of patient safety contributes to the attitudes, activities and values of staff that shows a commitment to: protect patients from harm; promote their well being; reduce the likelihood of adverse events; and voice concerns related to patient safety. Patient safety should be ingrained in all aspects of care and services provided by the imaging service to its patients. Creating a culture of patient safety makes it clear and obvious to staff and patients that patient safety is a priority.
ACCREDITATION STANDARDS
PATIENT SAFETY

DPS 1.0  The imaging service creates a culture of patient safety and makes patient safety a priority.

DPS 1.1  The imaging service implements strategies to contribute to a culture of patient safety.

DSP1.1.1 Policies and procedures are in place that clearly identify patient safety as a core priority.

DSP1.1.2 Teamwork and effective communication are emphasized and encouraged to optimize patient safety.

DSP1.1.3 Staff is encouraged to identify, provide feedback on, and communicate openly about patient safety issues and concerns.

DSP1.1.4 There is a process for patients, clients and their families to report concerns related to patient safety.

DSP1.1.5 There are systems in place to ensure that patient safety notices, alerts and/or other communications concerning patient safety which require action are acted upon within required time-frames.

DSP1.1.6 Mechanisms are in place to address patient sensitivities and allergies.

DSP1.1.7 Alternate latex-free products are available (e.g. gloves, tourniquets etc.).

DSP1.1.8 All patient safety issues are documented and investigated.

DSP1.1.9 All patient safety issues are documented and investigated.

DSP1.1.10 Information on patient safety issues is used to make improvements and enhance patient safety.

DPS 1.2 Patient safety training and on-going professional development are provided to staff.

DSP1.2.1 On-going patient safety training and professional development is provided to staff.

DSP1.2.2 Literature on patient safety is reviewed on a regular basis and information is incorporated into professional development programs for staff.

DSP1.2.3 There are processes in place to ensure that staff are aware of and are able to demonstrate their roles and responsibilities relative to patient safety.

DSP1.2.4 Staff is able to recognize, anticipate and manage situations that may place patients at risk.

DPS 1.3 Patient safety is safeguarded through effective continuity of care.

Intent: Continuity of care refers to the provision of seamless patient care and service(s) through effective integration, coordination and information sharing amongst the various healthcare providers involved in the patient’s care and/or service(s). Having processes in place to enhance continuity of care helps to protect patients from harm from a lack of communication amongst healthcare providers. It also helps to ensure that patients receive appropriate support to access other services as necessary.  

DSP1.3.1 There are methods in place to ensure effective collaboration and communication amongst healthcare providers (including the patient’s primary care physician) involved in the care or service(s) of a patient.

DSP1.3.2 There are methods in place to ensure effective and timely transfer of patient information between healthcare providers at interface points as applicable (e.g. shift changes, discharge, movement to other departments etc.).
DPS 1.4 Examination results are communicated to the appropriate health care provider(s) in a timely and effective manner.

DPS1.4.1 Processes are in place to ensure that the results of examinations and procedures are communicated to the appropriate individuals involved in the patient’s care in a timely and effective manner.

**PATIENT IDENTIFICATION**

*Introduction:*
Correctly identifying a patient prior to their examination or procedure is a crucial aspect of patient safety. Patient misidentification can result in harm to patients from potential wrong person, wrong site procedures, and reporting errors. Therefore, methods must be in place to ensure that patients are accurately identified. Confirmation of patient identification must occur prior to any examination or procedure by the individual performing the examination or the procedure. This allows for any discrepancies in patient identification information and the requested examination or procedure to be reconciled prior to commencing the examination or procedure. Standardized patient identification procedures should be followed by staff for both out-patients and in-patients, as well as pediatric and other patients who cannot provide identification information themselves.

DPS 2.0 Positive patient identification precedes commencement of the examination or procedure.

DPS 2.1 Patient identification is confirmed prior to a patient’s examination or procedure by the individual(s) performing the examination or procedure.

DPS2.1.1 Staff is provided with training on verifying patient identification.

DPS2.1.2 Patients are involved in the identification process to the extent possible.

DPS2.1.3 Positive patient identification is confirmed prior to commencing all procedures and examinations by the person(s) performing the examination or procedure.

DPS2.1.4 At least two unique patient identifiers are used when verifying patient identification.

DPS2.1.5 The imaging service maintains a list of acceptable patient identifiers.

*Guidance: Acceptable patient identifiers include the patient’s first and last name and date of birth; or patient’s first and last name and a unique personal identifier number (e.g. Provincial Health Number).*

DPS2.1.6 In-patients are identified with a wristband or approved alternative procedure.

DPS2.1.7 Staff confirms that information on the wristband is consistent with verbal information provided by the patient.

DPS2.1.8 Pediatric and other patients who cannot provide identification information are identified by a responsible adult.

DPS2.1.9 Patient identity information discrepancies are resolved prior to performing the examination or procedure.
ACCREDITATION STANDARDS
PATIENT SAFETY

DPS 2.2  There are methods in place to address situations where the identity of the patient is unknown.

DPS2.2.1  M  An emergency identification method is used when the patient’s identity is unknown.  
  Guidance: This may contain an alias name and a unique facility-issued number (e.g. medical record number, etc.).

DPS2.2.2  M  The temporary patient identification is attached to the patient, and affixed on patient samples, as applicable.

DPS2.2.3  M  The temporary patient identification is cross-referenced with the patient’s name and ID number when that name and number becomes known.

THE UNIVERSAL PROTOCOL

Introduction:
The universal protocol applies to all invasive procedures and consists of a series of three steps undertaken to protect patient safety and prevent the occurrence of errors, adverse events and critical incidents from wrong person, wrong site and wrong procedure in healthcare organizations and outpatient settings. The universal protocol consists of the following steps:

1) A pre-procedure verification process.
2) Marking the procedural site.
3) A final “time out” verification process immediately before the procedure.

Invasive procedures, especially those requiring general anesthesia or deep sedation, place patients at risk. Patient safety for patients undergoing these procedures can be enhanced by conducting the universal protocol to verify patient identity, procedure and site prior to commencing the procedure.

DPS 3.0  The universal protocol is conducted for all patients undergoing invasive procedures.

DPS 3.1  The imaging service has a policy and procedure in place for conducting the universal protocol.

DPS3.1.1  M  There is a policy that outlines the process for conducting the universal protocol.
DPS3.1.2  M  The policy clearly specifies the procedures that fall within the universal protocol.
DPS3.1.3  M  Staff are provided with orientation and training on how and when to conduct the universal protocol.
DPS 3.2  A pre-procedure verification process is conducted and documented for all procedures that fall within the universal protocol.²

Intent: A pre-procedure verification enables the imaging service to ensure that the correct procedure is performed on the right person. During the pre-procedure verification process, the imaging service verifies that the necessary documentation and equipment are available, that they are correctly identified and labeled, and that they are consistent with the expectations of the patient and the procedure team. Any discrepancies must be reconciled prior to commencing the procedure.

DPS3.2.1  M □ There is a process in place to verify the correct procedure, for the correct patient, at the correct site prior to the procedure commencing.

Pre-procedure verification includes verification of the following:

DPS3.2.2  M □ patient identification.
DPS3.2.3  M □ patient medical history.
DPS3.2.4  M □ labeled test results and reports as applicable (e.g. pathology and imaging reports).
DPS3.2.5  M □ signed consent with the correct procedure verified.

DPS 3.3  The procedure site is marked prior to commencing procedures that fall within the universal protocol.³

Intent: Marking the procedure site protects patients from potential wrong-site procedures, particularly when there is more than one possible location for a procedure. A consistent marking process for marking procedure sites should be used throughout the imaging service.

DPS3.3.1  M □ Procedures that require marking of the site prior to the procedure are identified.
DPS3.3.2  M □ Patients are involved in the marking of the site if possible.
DPS3.3.3  M □ The procedure site is marked by the individual who is accountable for the procedure and who will be present when the procedure is performed.
DPS3.3.4  M □ The process for marking the site, and the type of mark, is used consistently throughout the imaging service.
DPS3.3.5  M □ There is a process in place to verify the site when patients refuse site marking or when it is not technically or anatomically possible to mark the site.

DPS 3.4  A time-out (final verification) is performed prior to procedures that fall within the Universal Protocol.⁴

Intent: The time-out is an intentional pause in activity taken immediately prior to commencing the procedure to clearly communicate and verbally confirm the patient, procedure and site amongst all members of the procedure team. All questions and/or concerns must be addressed prior to commencing the procedure.

DPS3.4.1  M □ A time-out is conducted immediately before starting the procedure.
DPS3.4.2  M □ The time-out is standardized and involves members of the procedure team.

During the time-out, the team verifies the following:

DPS3.4.3  M □ correct patient identity.
DPS3.4.4  M □ correct procedure (verified with consent).
DPS3.4.5  M □ correct procedure site (verified with site marking if applicable).
DPS3.4.6  M □ Completion of the time-out is documented.
MEDICATION MANAGEMENT & ADMINISTRATION

Introduction:

Medication errors have the potential to cause significant harm and even death to patients. Therefore all services which administer medication to patients must have processes in place to ensure that they are managed and administered to patients as safely as possible. To enhance patient safety, patients should be involved in their medication management and administration to the fullest extent possible. Effective medication management and administration includes the safe storage and labeling of medications, reviewing medication orders and medication reconciliation.

**DPS 4.0**  The imaging service has methods in place to ensure that medication is managed and administered to patients safely and effectively.

*Guidance: Examples of medications include analgesics, anesthetics, contrast agents, narcotics, sedatives, and intravenous solutions.*

**DPS 4.1**  Medications are stored safely.

- **DPS4.1.1**  M  Storage of medications complies with manufacturer’s recommendations.
- **DPS4.1.2**  M  All stored medications are labeled with the contents, expiration date, and any warnings as applicable.
- **DPS4.1.3**  M  The imaging service periodically inspects all medication storage areas and makes changes to enhance safety as necessary.

**DPS 4.2**  The imaging service ensures that all medications are labeled.

- **DPS4.2.1**  M  Medication containers are labeled with the medication name, strength and quantity whenever medications are prepared but not administered immediately.
- **DPS4.2.2**  M  All medications are labeled with the date prepared and the expiration date when prepared but not administered within 24 hours or when the expiration occurs in less than 24 hours.
- **DPS4.2.3**  M  Any medication containers found unlabeled are immediately discarded.

**DPS 4.3**  The appropriateness of all medication orders is reviewed.

- **DPS4.3.1**  M  Only authorized staff request medications.
- **DPS4.3.2**  M  Medication orders are reviewed for possible patient allergies or sensitivities.
- **DPS4.3.3**  M  Medication orders are reviewed for the appropriateness of the dose, frequency, and route of administration.
- **DPS4.3.4**  M  Medication orders are reviewed for potential contraindications and adverse interactions.
- **DPS4.3.5**  M  All concerns, issues, or questions related to the appropriateness of a medication order are clarified with the prescriber and/or staff involved with the patient’s care or services prior to administration.
### ACCREDITATION STANDARDS
**PATIENT SAFETY**

#### DPS 4.4

**There is a demonstrated, formal process for reconciling patient medications.**

**Intent:** Medication reconciliation refers to the process of comparing a patient’s medication orders to all of the medications that the patient has been taking so that any discrepancies and/or contraindications are transparent and can be reconciled prior to administration. This reconciliation is done to avoid medication errors such as omissions, duplications, dosing errors or drug interactions. It should be done at every transition of care in which medications are ordered and/or existing orders are re-written. The ultimate goal of medication reconciliation is to prevent adverse drug events at all interfaces of care for all patients.

<table>
<thead>
<tr>
<th>Code</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>DPS4.4.1</td>
<td>M ☐ There is a procedure that outlines the process for medication reconciliation.</td>
</tr>
<tr>
<td>DPS4.4.2</td>
<td>M ☐ The responsibilities for medical practitioners, pharmacists and other staff in the medication reconciliation process are clearly defined as applicable to the imaging service.</td>
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</tbody>
</table>
| DPS4.4.3 | M ☐ A complete and accurate list of the patient’s current medications (including dose, route and frequency) and known allergies is obtained and documented.  
*Guidance:* Patients, families and/or a substitute decision maker should be involved in obtaining the list of patient medications. Strategies should be in place to obtain information from patients with communication difficulties. |
| DPS4.4.4 | M ☐ The medications ordered for the patient are compared to those on the list by a medical practitioner and/or other authorized staff involved in the patient’s medication selection and administration. |
| DPS4.4.5 | M ☐ All discrepancies and/or contraindications between the list and the medications ordered are reconciled and documented. |
| DPS4.4.6 | ☐ The patient’s most current list of reconciled medications is communicated to the next provider of care, treatment or services within or outside the imaging service if applicable. |

#### DPS4.5

**Medications are administered safely.**

<table>
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<tr>
<th>Code</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>DPS4.5.1</td>
<td>M ☐ Only medical practitioners and authorized staff obtain and administer medication.</td>
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<tr>
<td>DPS4.5.2</td>
<td>M ☐ Patient identity is verified prior to medication administration.</td>
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<tr>
<td>DPS4.5.3</td>
<td>M ☐ There is a process in place to ensure that the correct medication is selected prior to administration.</td>
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<tr>
<td>DPS4.5.4</td>
<td>M ☐ Prior to administration, the medication is visually inspected for color, clarity and expiration date.</td>
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<tr>
<td>DPS4.5.5</td>
<td>M ☐ There is a procedure for dealing with multi-dose medication vials.</td>
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<tr>
<td>DPS4.5.6</td>
<td>M ☐ There is a process in place to ensure that the individual administering the medication verifies that no contraindications exist prior to administration.</td>
</tr>
<tr>
<td>DPS4.5.7</td>
<td>M ☐ There is a process in place to ensure the individual administering the medication verifies that the medication is administered at the proper time, in the prescribed dose, and by the correct route to the correct patient.</td>
</tr>
</tbody>
</table>
ACCREDITATION STANDARDS
PATIENT SAFETY

DPS 4.6 Patients are monitored to ensure that medication(s) have been administered safely and effectively.  

DPS4.6.1 M □ Patients are monitored to assess the effectiveness of the medication(s) administered to them.  
DPS4.6.2 M □ Patients are monitored for any potential side effects and/or adverse reactions resulting from medication administration.  
DPS4.6.3 M □ Staff know how to respond to actual or potential adverse drug events, significant drug reactions, and medication errors.  
DPS4.6.4 M □ Policies and procedures are in place to ensure the safety of patients prior to discharge or release from the imaging service after having had medications administered to them.  
Guidance: An example of this would be for patients who have been administered mild sedation (e.g. Ativan) for a procedure. Prior to the patient being discharged, the imaging service should ensure that the patient has a safe way of getting home.

RISK & DISCLOSURE

Introduction:  
A core element of patient safety is the prevention, reduction and mitigation of adverse events, critical incidents and other unanticipated incidents with the potential to cause harm to patients. However, despite best efforts to prevent patient incidents and adverse events, they may still occur and therefore, the imaging service must have processes in place to ensure they are dealt with in an effective and timely manner that optimizes patient well-being and protects them from further harm to the extent possible.

Definitions:  

Adverse events can be defined in three ways:
- An unexpected and undesired incident directly associated with the care or services provided to the patient;
- An incident that occurs during the process of providing health care and results in patient injury or death;
- An adverse outcome for a patient, including injury or complication.

Critical incident is defined as an incident resulting in serious harm to the patient, or the significant risk thereof. Incidents are considered critical when there is an evident need for immediate investigation and response. The investigation is designed to identify contributing factors and the response includes action to reduce the likelihood of recurrence.

Disclosure is understood as the imparting, by health-care workers to patients or their significant others, of information pertaining to any health-care event affecting (or liable to affect) the patient’s interests. The obligation to disclose is proportional to the degree of actual harm to the patient (or realistic threat of such) arising from an untoward event.
ACCREDITATION STANDARDS
PATIENT SAFETY

DPS 5.0 
**Adverse events and critical incidents are managed appropriately.**

DPS 5.1 
**Staff receive appropriate orientation and training related to risk management practices that includes:**
- DPS 5.1.1 definitions of adverse events and critical incidents.
- DPS 5.1.2 reporting processes.
- DPS 5.1.3 a process for determining medical significance.
- DPS 5.1.4 training to prevent or contain the effects of adverse events and critical incidents.
- DPS 5.1.5 a process for disclosing information to patients.
- DPS 5.1.6 findings from literature on the impact of adverse events on patients and their families should be integrated into continuing professional development and training programs for staff.

DPS 5.2 
**There are policies, procedures and practices for identifying and reporting adverse events and critical incidents.**
- DPS 5.2.1 definitions of adverse event and critical incident applicable to imaging are communicated throughout the imaging service.
- DPS 5.2.2 policies, procedures and practices for reporting adverse events and critical incidents are documented and available to all staff.
- DPS 5.2.3 staff know whom to contact for advice or direction.
- DPS 5.2.4 there is a defined process for reporting an adverse event or critical incident to the administration of the organization and to outside organizations, as applicable.
- DPS 5.2.5 there are mechanisms in place for management to regularly track and trend aggregate data collected through the reporting process.

DPS 5.3 
**There is a process to determine and manage the medical significance of adverse events and critical incidents.**
- DPS 5.3.1 all reported adverse events and critical incidents are immediately assessed by appropriate technical and medical staff to determine medical significance.
- DPS 5.3.2 the referring practitioner is informed in cases of medical significance.
- DPS 5.3.3 appropriate technical and medical staff assesses indications for halting further examinations and withholding the patient diagnostic reports.
- DPS 5.3.4 appropriate technical and medical staff assesses indications for recalling already released patient diagnostic reports.
- DPS 5.3.5 there are methods for reviewing already released patient diagnostic reports.

DPS 5.4 
**There is a systematic process to investigate adverse events and critical incidents to determine multiple underlying contributing factors.**
- DPS 5.4.1 all adverse events and critical incidents are investigated appropriate to the magnitude of the problem and risk to patient and/or staff safety.
- DPS 5.4.2 processes for investigation are documented and available to all staff.
- DPS 5.4.3 staff is aware of their role during an investigation.
- DPS 5.4.4 staff know whom to contact for advice or direction.
ACCREDITATION STANDARDS  
PATIENT SAFETY  

DPS 5.5 Recommendations resulting from investigations are implemented to decrease the likelihood of recurrence.

DPS5.5.1 M □ Changes made to the imaging service’s systems and processes to prevent recurrence are documented.

DPS5.5.2 □ Recommendations and changes implemented are communicated to relevant staff.

DPS 5.6 Changes implemented are monitored to ensure effectiveness.

DPS5.6.1 □ Recommendations implemented are evaluated to ensure they are producing the intended effect.

DPS5.6.2 □ The responsibility for authorization of the resumption of examinations is defined.

DPS5.6.3 □ Continuous evaluation and/or audit occurs if there is doubt related to compliance with policies and/or procedures being performed as documented.

DPS 5.7 There are policies, procedures and practices for disclosing information to patients when an adverse event and/or critical incident has occurred.

DPS5.7.1 □ Policies, procedures and practices are documented and available to all staff.

DPS5.7.2 □ Staff is knowledgeable about disclosure practices and knows where to locate appropriate policy and procedure documentation.

DPS5.7.3 □ Staff knows whom to contact for advice or direction.

DPS5.7.4 □ Support and counseling are available to patients and their families following an adverse event or critical incident.

EMERGENCY MANAGEMENT

Introduction:
The imaging service should make every effort to prevent the occurrence of medical emergencies. However, should a medical emergency occur the imaging service should be adequately prepared and have the resources in place to handle them in a timely and efficient manner. Having knowledgeable staff respond to medical emergencies in a timely manner with the resources necessary to do so, can save patient lives.

DPS 6.0 The imaging service has procedures in place to handle medical emergencies.

DPS 6.1 There are procedures to handle medical emergencies in a timely and effective manner.

DPS6.1.1 M □ Staff are familiar with the procedure(s) for responding to medical emergencies.

Staff know how to access:

DPS6.1.2 M □ emergency medical services.

DPS6.1.3 M □ emergency equipment and supplies.

DPS6.1.4 M □ There is a documented procedure in place for dealing with cardiopulmonary arrests.
DPS 7.0  Emergency procedures, equipment and supplies are available to address medical emergencies resulting from high risk procedures.

Intent: High risk procedures may result in the need for emergency patient management. High risk procedures include complex interventional procedures, TEE, stress echocardiography examinations, and the administration of moderate sedation or general anesthesia. Having attending personnel trained and experienced in the use of emergency equipment and supplies is required to deal with a variety of complications that can arise during imaging procedures. Examples of patient complications include cardiac arrest, life-threatening hemorrhage, anaphylactic contrast reaction, vasovagal reactions, and sedation-related respiratory compromise.

DPS 7.1  Emergency procedures, equipment and supplies are available to respond to a medical emergency.

DPS7.1.1  M  There is an emergency response protocol in place.
DPS7.1.2  M  A minimum of one medical and/or technical staff member has current CPR certification and is present during the procedure(s).
DPS7.1.3  M  Staff who may respond to emergencies have been trained on the use of resuscitation and monitoring equipment.
DPS7.1.4  M  Drills to rehearse and refine emergency response protocols are performed to protect patients, staff and responders.
DPS7.1.5  M  Emergency call systems are available in patient care areas.

Emergency equipment and supplies are:

DPS7.1.6  M  appropriate for the patient population (e.g. adults and pediatrics).
DPS7.1.7  M  monitored and maintained.
DPS7.1.8  M  available.
DPS7.1.9  M  safe.
DPS7.1.10  M  secure.

Emergency drugs are:

DPS7.1.11  M  available.
DPS7.1.12  M  within expiry date.
DPS7.1.13  M  secure.

DPS 7.2  The Echocardiography service ensures that emergency equipment and supplies are available to deal with a medical emergency.

See also Echocardiography Accreditation Standards EC 11.0, EC 11.1 and EC 11.2 for physical environment requirements when performing transesophageal echocardiography and stress echocardiography.

DPS7.2.1  M  Oxygen and suction equipment with appropriate delivery devices and attachments are readily available.
DPS7.2.2  For TTE examinations, there is an emergency crash cart that is available to reach the patient within 30 seconds.
DPS 7.3  The **Computed Tomography (CT)** service ensures that emergency equipment and supplies are available to deal with a medical emergency. 
*See also Global Modality Accreditation Standards GM 4.1 and GM 4.2*

DPS7.3.1  M □ Oxygen and suction equipment with appropriate delivery devices and attachments are readily available.

DPS 7.4  The **Magnetic Resonance Imaging (MRI)** service ensures that emergency equipment and supplies are available to deal with a medical emergency.  
*See also Global Modality Accreditation Standards GM 4.1 and GM 4.2*

DPS7.4.1  M □ Oxygen and suction equipment with appropriate delivery devices and attachments are readily available.

DPS 7.5  The **Nuclear Medicine** service ensures that emergency equipment and supplies are available to deal with a medical emergency. 
*See also Nuclear Medicine Accreditation Standards NM 3.7*

DPS7.5.1  M □ Oxygen and suction equipment with appropriate delivery devices and attachments are readily available.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


Joint Commission 2009 Hospital Accreditation Standards. Illinois, USA.

Joint Commission 2009 Laboratory National Patient Safety Goals, Illinois, USA.


SPECIFIC DOCUMENTS REFERENCED


ACCREDITATION STANDARDS 2010

INFECTION PREVENTION AND CONTROL

Introduction:
Facilities establish infection prevention and control activities and precautions to help reduce the possibility of acquiring and transmitting an infection. The type and scope of the activities and precautions are influenced by the size of the facility, the resources available, the services provided, and the patients served.

This section of the accreditation standards addresses:
- Planning
- Routine precautions
- Additional precautions
- Cleaning of surfaces and ancillary medical equipment
- Decontamination of reusable semi-critical medical devices

PLANNING

Introduction:
Every workplace is unique therefore an infection prevention and control plan should be facility specific. These plans should be developed by qualified people who are knowledgeable of the work, the hazards involved and the means to control the hazard by reason of education, training, experience, or a combination of all.

DIPC 1.0 Planning for infection prevention and control is effective, integrated and coordinated.

DIPC 1.1 An infection prevention and control plan is developed and implemented.
The infection prevention and control plan includes:
DIPC1.1.1 M assigned responsibility for the infection prevention and control activities.
DIPC1.1.2 M documented policies and procedures for infection prevention and control e.g. an infection control manual.
DIPC1.1.3 M procedures and processes associated with increased risk of infection to staff, patients and visitors are identified and assessed.
DIPC1.1.4 M activities and precautions used to eliminate or minimize the risk of infection generally and when carrying out defined procedures and processes.

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DIPC1.1.5  ☐ scheduled and documented staff education for infection prevention and control.
DIPC1.1.6  ☐ access to up to date infection prevention and control resources.

Guidance: This could include, but not be limited to, an infection control practitioner, expert consultant(s) and websites such as the B.C. Centre for Disease Control, the U.S. Centers for Disease Control and Prevention, and the B.C. Provincial Infection Control Network (PICNet).

DIPC1.1.7  ☐ infection prevention and control surveillance or monitoring activities.
DIPC1.1.8  ☐ review and analysis of infection control data.
DIPC1.1.9  ☐ actions taken when infection control issues are identified.
DIPC1.1.10 ☐ reporting of infection control surveillance, prevention and control information to an appropriate authority.
DIPC1.1.11 ☐ periodic review of the infection prevention and control plan.

DIPC  1.2  The imaging service provides education to prevent and control infections.

Guidance: All staff (physicians, nurses, technologists, students, volunteers and others) are responsible for complying with routine practices and additional precautions.

DIPC1.2.1 M ☐ All staff receives ongoing training in the applicable infection prevention and control policies and procedures relevant to their position or job.
DIPC1.2.2 M ☐ Staff are made aware of the procedures to follow when exposures occur e.g. needle stick injuries, splashes of blood or body fluids, exposure to infectious patients.

ROUTINE PRACTICES

DIPC  2.0  Routine practices for preventing the transmission of infection are implemented.

Guidance: The term routine practices (or ‘standard precautions’) is used to describe the system of infection prevention to prevent transmission of infections in health care settings. These practices are to be used at all times, with all patients regardless of diagnosis or infectious status.

DIPC  2.1  Hand hygiene activities and practices are used to prevent and control the spread of infection.

Intent: Hand hygiene is the single most important activity for preventing the transmission of infections.

DIPC2.1.1 M ☐ There are sufficient, readily accessible, designated hand hygiene sinks or other accessible forms of hand hygiene products.
DIPC2.1.2 M ☐ Hand hygiene is performed with plain soap and running water, or alcohol based hand rubs.
Hand hygiene is performed:

- **DIPC2.1.3** M □ before and after direct contact with a patient.
- **DIPC2.1.4** M □ between clean and dirty procedures on the same patient.
- **DIPC2.1.5** M □ before gloves are donned and immediately after removing gloves.
- **DIPC2.1.6** M □ before preparing or handling medications.
- **DIPC2.1.7** M □ if the staff member’s skin becomes visibly contaminated e.g. after contact with blood or body fluids.
- **DIPC2.1.8** M □ Plain soap and running water are used for hand hygiene when the patient is known to have an active infection with *Clostridium difficile*.
- **DIPC2.1.9** M □ An antiseptic skin preparation agent is used when performing sterile or invasive procedures.

### DIPC 3.0 Personal Protective Equipment (PPE) is worn by staff as a barrier against blood and body fluid exposure.

*Guidance: See also General Safety Accreditation Standard DSA 1.12.*

- **DIPC3.1.1** M □ changed between patients.
- **DIPC3.1.2** M □ used at all times when there is potential contact or exposure to blood and body fluids.
- **DIPC3.1.3** M □ removed and disposed of properly or reprocessed according to manufacturers recommendations.

### DIPC 3.2 Gloves are worn by staff for protection against infection.

*Intent: Gloves are used as an additional measure, not as a substitute for appropriate hand hygiene. Gloves are not required for routine patient care activities.*

Gloves are worn when:

- **DIPC3.2.3** M □ handling or cleaning any item visibly soiled with blood and body fluids.
- **DIPC3.2.4** M □ performing procedures or patient care activities which are likely to generate splashes or sprays of blood, body fluids or other potentially infectious fluids.
- **DIPC3.2.5** M □ the staff member has open skin lesions on their hands.
- **DIPC3.2.6** M □ Gloves are changed between patients and procedures and disposed of properly.
- **DIPC3.2.7** M □ Gloves are removed immediately after completion of care or a specific task and before touching clean environmental surfaces.
- **DIPC3.2.8** M □ Sterile gloves are worn for sterile interventional procedures.
- **DIPC3.2.9** M □ Gloves for latex sensitive workers are available.
- **DIPC3.2.10** M □ Single-use disposable gloves are not reused or washed.
DIPC  3.3  Face protection is worn, or used to protect against splashes.
Guidance: Masks in combination with eye protection, or face shields, are worn to protect the mucous membranes of the eyes, nose and mouth.

DIPC 3.3.1 M☐ Masks and eye protection, or face shields are worn for activities likely to generate splashes or sprays of blood or body fluids.

DIPC  3.4  The imaging service has a process for the assessment and use of a N95 respirator/mask.

DIPC 3.4.1 M☐ A risk assessment is conducted to determine if and when the use of N95 respirators/masks for staff is necessary.
Intent: An N95 respirator/mask helps protect staff from respiratory pathogens that are transmitted via the airborne route. Staff must use N95 respirators/masks if they may be exposed to an airborne infection that is listed in the WorkSafe BC Regulations and a risk assessment has indicated that this infection poses a potential hazard. It is recommended that the imaging service consults with Occupational Health and Safety (OH&S) and infection control resources regarding conducting the risk assessment.

DIPC 3.4.2 M☐ Fit testing of N95 respirators/masks is performed annually and is documented.
Intent: A respirator/mask will not be effective unless it forms an adequate seal against the staff members face. The only way to be certain a specific respirator/mask forms this seal is to conduct a fit test.

DIPC  3.5  Gowns are worn by staff as a barrier against infection.

DIPC 3.5.1 M☐ Gowns are worn when there is potential for soiling clothing with blood, body or other fluids.
Guidance: Gowns should be fluid resistant.

DIPC  3.6  Safe and effective practices are followed for the use and disposal of sharps.

DIPC 3.6.1 M☐ Safety engineered needleless systems or devices that have built in safety mechanisms are used.

DIPC 3.6.2 M☐ Used needles and other sharp instruments are not recapped.

DIPC 3.6.3 M☐ Used sharps are disposed of immediately in designated puncture resistant containers located in the immediate area where the sharp was used.
Guidance: In areas where sharps containers have not been mounted, portable sharps containers should be used.

DIPC 3.6.4 M☐ Sharps containers are sealed and replaced when they are three quarters full.

DIPC 3.6.5 M☐ Sharps containers are appropriately disposed.
**ADDITIONAL PRECAUTIONS**

**DIPC 4.0**  
Patients, staff and visitors are protected from potential or known communicable diseases.

**DIPC 4.1**  
Additional precautions are used for patients with known or suspected communicable diseases.

*Intent: Additional infection prevention and control precautions are necessary for specific certain pathogens or clinical presentations. Professional knowledge, skill and judgment are used to assess the potential routes of transmission and the appropriate additional precautions to be taken e.g. contact, droplet, droplet/contact, or airborne precautions.*

**DIPC4.1.1**  
M □ Patients with known or potential communicable diseases are identified at time of admission to the facility/department.

*Guidance: Known or suspected communicable diseases may be identified in many ways for example asking the patient, notation on the requisition, or noted in the RIS. It is not necessary to wait for a specific diagnosis or microbiologic confirmation before initiating appropriate precautions when patient assessment clearly indicates a clinical syndrome or risk factors related to a potentially communicable disease. For the patient who has, or is suspected of, having a disease requiring additional precautions it is important to institute these precautions immediately. They may be instituted by any health care provider as soon as the communicable disease, clinical presentation, or risk factors are suspected or identified.*

**DIPC4.1.2**  
M □ For patients with a known or potential, communicable disease, appropriate staff are notified of additional precautions required.

**DIPC4.1.3**  
M □ Patients with a known or potential communicable disease are placed directly into a single room and do not wait in a common waiting room.

**DIPC4.1.4**  
M □ If a single room is not available, the patient is placed in an area of the waiting room separated from other patients by at least 2 meters, and time spent in the waiting room is minimized.

*Intent: This is if infection is spread by droplet route. If spread by aerosol route, e.g. chicken pox or measles, the 2 meter distance does not apply.*

**DIPC4.1.5**  
M □ The patient wears a procedure mask if they are coughing or sneezing and hand hygiene is offered when appropriate.

**DIPC4.1.6**  
M □ N95 respirators/masks are available for all staff that enter the procedure room if there is a known, or suspected airborne infection.

*Guidance: Airborne transmission refers to transmission of infection by inhaling aerosols e.g tuberculosis, measles, or chicken pox (varicella). This can occur when a patient coughs, sneezes, or talks. These infectious agents can be acquired by susceptible individuals who may be at some distance away from the source patient.*

**DIPC4.1.7**  
M □ An appointment is scheduled at the end of the day to minimize exposure for other patients.
DIPC 4.2  Mechanisms are in place to ensure staff have current up to date immunizations or are aware of their previous infectious disease medical history.

DIPC 4.2.1 M □ All staff are aware of and have documentation of their vaccination history, medical history, or serologic test results.

DIPC 4.2.2 M □ Staff that has the potential to be exposed to blood and body fluids are offered Hepatitis A and B vaccination.

Guidance: The WorkSafe BC requirements are for Hepatitis B. The vaccination series must be offered to employees with “occupational exposure to blood borne pathogens”. Occupational exposure is defined as reasonably anticipated contact.

DIPC 5.0  Blood and body fluids precautions for staff are safe and effective.

DIPC 5.1  There is a defined follow up process that addresses possible or actual blood and body fluids exposure.

DIPC 5.1.1 M □ For blood and body fluids exposures the staff member has local first aid administered, if required, and then is immediately referred for medical assessment (within 2 hours) and appropriate therapy and follow up.

Guidance: It is preferable to go to an emergency department as they have the necessary medications on site, rather than a family physician who does not have the medications in his/her office.

DIPC 5.1.2 M □ An incident investigation is completed for all staff who have a potential or actual blood or body fluid exposure.

DIPC 5.1.3 M □ There are documented policies and procedures for the prevention and follow-up of blood and body fluids exposures.

Guidance: See also General Safety Accreditation Standards DSA 1.2.2 and DSA 1.2.3.
## CLEANING OF SURFACES AND ANCILLARY MEDICAL EQUIPMENT

**DIPC 6.0**  
The physical environment of the imaging service is clean.

**DIPC 6.1**  
**Safe and effective cleaning of the physical environment is ensured.**

- **DIPC 6.1.1**  
  M □ Policies and procedures are in place indicating the frequency and method of environmental cleaning and disinfection.

- **DIPC 6.1.2**  
  M □ Equipment and surfaces in direct contact with an infected patient or blood and body fluids are cleaned and disinfected before the room is used for another patient.

- **DIPC 6.1.3**  
  M □ A barrier (sheet or paper) is placed on the procedure table and changed between patients. Alternatively, the table is cleaned between patients.

- **DIPC 6.1.4**  
  M □ If there is significant environmental contamination (e.g. stool, urine, wound drainage, or uncontrolled respiratory secretions) all horizontal surfaces and frequently touched surfaces are appropriately cleaned and disinfected before the room and/or equipment is used for another patient.

- **DIPC 6.1.5**  
  M □ The procedure table and patient care equipment is cleaned between patients.

- **DIPC 6.1.6**  
  M □ Paper liners, linens, patient gowns etc. are appropriately disposed of or laundered between patients

- **DIPC 6.1.7**  
  □ Carpets in patient care areas are cleaned regularly.

**DIPC 6.2**  
The imaging service reduces the risk of infections associated with ancillary medical equipment.

- **DIPC 6.2.1**  
  M □ Routine patient care equipment is cleaned or disposed of between patients (e.g. blood pressure cuffs, stethoscope, tourniquets).

- **DIPC 6.2.2**  
  M □ Direct patient care equipment is appropriately cleaned and disinfected.

- **DIPC 6.2.3**  
  M □ Equipment touching mucous membranes or non-intact skin is appropriately cleaned and high level disinfected between patients.

- **DIPC 6.2.4**  
  M □ Single use medical devices are not reprocessed.  
  *Intent: The reuse of single-use devices can affect their safety, performance, and effectiveness and expose patients and staff to unnecessary risk.*
DECONTAMINATION OF REUSABLE SEMI-CRITICAL DEVICES

DIPC 7.0 Standardized reprocessing practices for the decontamination of reusable semi-critical medical devices are implemented.

Introduction:
A risk classification is given to medical devices that present a high risk of infection if contaminated by any microorganism. For purposes of these standards the risk classification of semi-critical devices will be addressed and for the imaging service this specifically covers trans-esophageal and endocavity probes.

Semi-critical devices are devices that come in contact with mucous membranes or non-intact skin, but ordinarily do not penetrate them. Reprocessing semi-critical devices involves meticulous cleaning followed by high-level disinfection (the type of disinfection required depends on the item).

DIPC 7.1 The imaging service provides staff education for the decontamination of reusable semi-critical medical devices.

There are policies and procedures that document, for each staff position in the decontamination area, the following requirements:

DIPC7.1.1 M □ the specific education required.
DIPC7.1.2 M □ the training to be provided.
DIPC7.1.3 M □ the experience necessary.
DIPC7.1.4 M □ how competency will be assessed.
DIPC7.1.5 M □ There is documentation of the initial and ongoing training staff receives.

DIPC 7.2 All areas for decontamination, preparation, and storage of medical devices are designed to minimize contamination and infection.

DIPC7.2.1 M □ There is a designated reprocessing area that is separated into distinct areas to ensure one-way work flow.
DIPC7.2.2 M □ Cleaning of the medical device is performed in a distinctly separate area from where disinfected/sterile medical devices are handled or stored.
DIPC7.2.3 □ Appropriate ventilation controls are utilized in the reprocessing area. Guidance: Consult MSDS sheets to ensure appropriate exposure controls and personal protection is used. Cidex OPA is recommended as a disinfectant.
DIPC7.2.4 □ Reprocessed medical devices are stored vertically in well-ventilated dedicated areas in a manner that minimizes contamination or damage.
DIPC7.2.5 □ Storage units are cleaned at least weekly, if used.
DIPC7.2.6 □ There is a process for identification of non-reprocessed medical devices from reprocessed medical devices.
DIPC 7.3 Medical devices are cleaned to minimize contamination and infection.
DIPC7.3.1 M ☐ Medical devices are thoroughly cleaned and rinsed prior to high level disinfection.
DIPC7.3.2 ☐ The medical device is placed in a covered container, in a manner that minimizes contamination of the environment and staff.
DIPC7.3.3 ☐ Detergents are prepared, changed and discarded according to manufacturer’s written instructions.
DIPC7.3.4 ☐ Detergents are discarded at least daily and when visibly contaminated.
DIPC7.3.5 ☐ Cleaning accessories are disposable or thoroughly cleaned and disinfected at least daily.

DIPC 7.4 Effective high level disinfectants are used to achieve decontamination of the medical device.
DIPC7.4.1 M ☐ Semi critical medical devices receive at a minimum high level disinfection.
DIPC7.4.2 M ☐ High level disinfectants have a Drug Identification Number (DIN) from Health Canada.
DIPC7.4.3 ☐ Current manufacturers’ instructions are used for the preparation of high level disinfection.
DIPC7.4.4 M ☐ Reusable high level disinfection concentration is checked daily at a minimum, with appropriate chemical test strips.
DIPC7.4.5 M ☐ Chemical test strips are used within the expiry date.
DIPC7.4.6 ☐ High level disinfectants are discarded as recommended by the manufacturer.
DIPC7.4.7 ☐ Neutralizing of high level disinfectant is performed in a separate container than that used for disinfection.
Guidance: A neutralizing agent is used prior to drainage disposal of disinfectant solutions. Prior to drainage of disinfection solutions the disinfectant should be neutralized in a separate container than the one used for disinfecting so as to not contaminate and possibly neutralize the fresh disinfectant. The disinfectant may permeate into some plastics. The neutralizer may then permeate back into the good solution and reduce the potency.

DIPC 7.5 There is a safe and effective process for high level disinfection.
DIPC7.5.1 M ☐ There are implemented procedures for reprocessing each different type of medical device.
DIPC7.5.2 M ☐ The medical device is completely immersed in the high level disinfectant for the manufacturers recommended time and temperature.
DIPC7.5.3 M ☐ The soaking container is kept covered between uses and is washed, rinsed and dried when the solution is changed.
DIPC7.5.4 M ☐ After disinfection the medical device is rinsed with sterile water, bacteria free water or as specified by the manufacturers recommendations.
DIPC7.5.5 ☐ After disinfection, the medical device is dried with a clean, lint-free cloth.
DIPC 7.6  Documentation for all aspects of the decontamination of contaminated reusable semi-critical medical devices is available.

DIPC 7.6.1  Detailed written policies and procedures for high-level disinfection (HLD) of medical devices are readily available for staff.

Documentation is available for the high level disinfection preparation which includes:

- DIPC 7.6.2  product name.
- DIPC 7.6.3  DIN number.
- DIPC 7.6.4  lot number.
- DIPC 7.6.5  expiry date.
- DIPC 7.6.6  date of solution change.
- DIPC 7.6.7  initials of staff performing preparation, and documentation.

Documentation is available for the quality control of high level disinfection and includes:

- DIPC 7.6.8  test strip name.
- DIPC 7.6.9  lot number.
- DIPC 7.6.10  expiry date.
- DIPC 7.6.11  test strip result.
- DIPC 7.6.12  initials of staff performing QC testing.

Documentation is available for the reprocessed medical device which includes:

- DIPC 7.6.13  medical device name.
- DIPC 7.6.14  serial number.
- DIPC 7.6.15  date of disinfection.
- DIPC 7.6.16  method of HLD.
- DIPC 7.6.17  contact time of the HLD.
- DIPC 7.6.18  temperature of the HLD.
- DIPC 7.6.19  initials of person performing the reprocessing.

Documentation is available for the record of the medical device which includes:

- DIPC 7.6.20  patient name.
- DIPC 7.6.21  patient record number.
- DIPC 7.6.22  date and time.
- DIPC 7.6.23  type of procedure.
- DIPC 7.6.24  serial number of scope.
- DIPC 7.6.25  initials of staff completing documentation.

DIPC 8.0  Standardized sterilization practices for the decontamination of reusable medical devices are implemented.

DIPC 8.1  There is a safe and effective process for sterilization of medical devices.

DIPC 8.1.1  Sterilization of medical devices by imaging service staff is performed following manufacturers instructions.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:

Clean Hands, Good Health a video tutorial on hand washing at: www.ahse.health.nb.ca/cleanhanDIPChsc/cleanhandsworkingahsc.html


Diagnostic Accreditation Program Accreditation Standards 2007. British Columbia, Canada

Health Canada Infection Control Guideline: Routine Practices and Additional Precautions for Preventing the Transmission of Infection in Health Care, 1999


WorkSafe BC. Controlling Exposure: Protecting Workers From Infectious Disease. 200.

GLOSSARY

Cleaning means the removal of all foreign material (e.g. soil, organic material) from the surface.

Decontamination is the process of cleaning, followed by the inactivation of pathogenic micro-organisms, in order to render an object safe for handling.

Detergent is a synthetic cleansing agent that can emulsify oil and suspend soil.

Disinfectant is a chemical agent that kills most disease-producing micro-organisms but not necessarily resistant bacterial spores.

Reprocessing means the steps performed to prepare used medical equipment devices for use (e.g. cleaning, high level disinfection, sterilization).

Sterilization is the complete elimination or destruction of all viable forms of microbial life, accomplished by either physical or chemical processes.
ACCREDITATION STANDARDS 2010

QUALITY IMPROVEMENT

Introduction:
To improve the quality and safety of services provided to patients, the imaging service must continuously evaluate its performance and use this information to identify ways that it can improve. This form of self-evaluation must be planned and ongoing, and must focus on systems, processes and the performance of individuals integral to the diagnostic and/or clinical process. Standardizing key processes and documenting best practices allows for the collection and analysis of data concerning the current performance of the key processes. This information can be used to focus improvement activities, and monitor the implementation of changes resulting from a structured continuous quality improvement process.

Every organization and imaging service, regardless of size, practices quality improvement to some degree. In some organizations, quality improvement may be highly formalized with comprehensive quality improvement plans and structures. In other organizations, quality improvement may be far less formal.

In reviewing the Quality Improvement accreditation standards, it is important for the imaging service to focus on the intent of the key activities and to establish a quality improvement program that fits with the service’s size, available resources, and culture.

The Quality Improvement section of the accreditation standards addresses:

- Establishing an integrated and coordinated Quality Improvement Program
- Providing leadership and structure to the Quality Improvement Program
- Evaluating operational processes through internal audit
- Evaluating clinical quality through clinical audit and medical peer review
- Proactively identifying and managing clinical risk
- Using performance measures to monitor clinical and operational quality

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QUALITY IMPROVEMENT PROGRAM (QIP)

Introduction:
The purpose of a Quality Improvement Program (QIP) is to objectively and systematically monitor and evaluate the quality and appropriateness of services provided, and to pursue opportunities for improvement. For a QIP to be effective, it must be integrated into organization-wide improvement efforts and have assigned leadership and oversight. A QIP consists of the integrated and coordinated activities of internal operational and clinical audit, clinical risk management and quality assurance and control activities. The size and structure of the organization and the imaging service will direct how comprehensive and resourced the QIP is.

DQI 1.0 Leadership is assigned to improve the quality and safety of services provided through an integrated and coordinated Quality Improvement Program (QIP).

DQI 1.1 There is an organization-wide quality improvement body that provides leadership and coordination to quality programs of the organization.

DQI1.1.1 The organization-wide quality improvement body is accountable for the direction and oversight of the organization’s quality programs.

DQI1.1.2 The organization-wide quality improvement body provides regular reports to the governing body/ownership.

DQI 1.2 The imaging service has a quality improvement committee.

DQI1.2.1 The committee is chaired by a leader within the imaging service.

DQI1.2.2 The membership of the committee is multidisciplinary including medical, technical and administrative staff of the imaging service, and other non-imaging service organizational representatives as appropriate.

There are terms of reference for the committee that include:

DQI1.2.3 setting priorities for the QIP.

DQI1.2.4 identifying required performance measures to be monitored.

DQI1.2.5 reviewing the analysis of aggregate data including the frequency of data collection and analysis.

DQI1.2.6 authority to direct action in response to identified quality improvement or patient safety issues.

DQI1.2.7 providing information to the organization-wide quality improvement body.

DQI1.2.8 communicating information to staff members.
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DQI  2.0  There is an integrated and coordinated Quality Improvement Program (QIP).

DQI  2.1  There is a written description of the Quality Improvement Program that identifies:

- the objectives of the QIP.
- an explicit definition of how quality is defined in the imaging service.
- who within the imaging service assumes responsibility for the implementation of
  the QIP and specific quality improvement projects.

  Guidance: The responsibility for the QIP may be assigned to an individual or to the
  quality improvement committee.

  the methodologies used for conducting quality improvement activities of:

- internal audit.
- clinical audit.
- medical peer review.
- utilization review and management.
- clinical risk assessment.

- the nature of technical support and resources provided to the QIP.
- how the QIP is linked to organization-wide quality improvement structures and
  initiatives.
- how the QIP is accountable to the governing body/ownership.
- how the QIP is evaluated.

DQI  2.2  Structures and systems are in place to implement and maintain the QIP.

- Roles, responsibilities and authorities of all individuals and structures of the QIP are
  defined.

  Reporting mechanisms are in place to ensure:

- methods used to identify and select appropriate quality improvement initiatives are
  communicated and shared.
- the status of staff training in quality improvement is known.
- the status and outcomes of quality improvement projects is communicated.
- issues or problems identified through QIP activities are resolved.

- Staff training in quality improvement methods and tools is provided.
DQI 3.0 The imaging service improves quality by documenting and auditing key operational processes.

DQI 3.1 Key operational processes are documented.

Guidance: Operational processes are those management related activities that are necessary to support the effective delivery of care and service. Examples may include: medical staff credentialing processes; delegation of medical functions; hiring practices, etc.

DQI3.1.1 Key operational processes that can impact quality of service are identified.
DQI3.1.2 Identified processes are documented through flowcharting and/or written procedures.

DQI 3.2 Key processes that are critical to the imaging service are validated and/or verified.

DQI3.2.1 Critical processes are identified.
DQI3.2.2 Critical processes are validated and/or verified.

DQI 3.3 An internal audit program is established to:

DQI3.3.1 ensure compliance with documented flowcharts and/or written procedures.
DQI3.3.2 to identify potential risks.
DQI3.3.3 to identify opportunities for improvement.

DQI 3.4 The internal audit program is planned and documented.

DQI3.4.1 Key operational processes subject to audit are identified.

Procedures for conducting internal audits are documented and include for each key operational process subject to audit:

DQI3.4.2 name of the key operational process.
DQI3.4.3 type of audit to be conducted.
DQI3.4.4 frequency of audit.
DQI3.4.5 individual appropriate to conduct the audit.

Guidance: It is preferable that individuals do not audit their own activities.

DQI3.4.6 methodology to conduct the audit.
DQI3.4.7 required documentation.
DQI3.4.8 individual/committee that results of the internal audit are to be submitted to.
Internal audits of the following key operational processes are undertaken:

for governance and leadership:

DQI 3.5.1 M governing authority/ownership’s review of quality and safety reports.
DQI 3.5.2 M leader/committee’s review of quality and safety reports.
DQI 3.5.3 M organizational chart development and maintenance.
DQI 3.5.4 M corporate risk management reporting.

for human resources:

DQI 3.5.5 M job description development and maintenance.
DQI 3.5.6 M orientation and training.
DQI 3.5.7 M process to assess the competency of staff.

for medical staff:

DQI 3.5.8 M credentialing process.
DQI 3.5.9 M delegation of medical acts.

for information management:

DQI 3.5.10 M document control process.
DQI 3.5.11 M document retention and storage processes.
DQI 3.5.12 M document destruction process.
DQI 3.5.13 M privacy and confidentiality processes.

for clinical informatics:

DQI 3.5.14 M data transmission process.
DQI 3.5.15 M data security and integrity.
DQI 3.5.16 M downtime procedures.

for safety:

DQI 3.5.17 M safety program.
DQI 3.5.18 M process to conduct safety inspections.
DQI 3.5.19 M patient identification process.
DQI 3.5.20 M radiation safety.

for patient and client focus:

DQI 3.5.21 M process to obtain informed consent.
DQI 3.5.22 M process to assess patient satisfaction.
DQI 3.5.23 M complaints management process.

for quality improvement:

DQI 3.5.24 M quality improvement program.
DQI 3.5.25 M internal audit process.
DQI 3.5.26 M clinical audit process.
DQI 3.5.27 M medical peer review process.
DQI 3.5.28 M clinical risk assessment process.
DQI 3.5.29 M utilization review and management process.
DQI 3.5.30 M performance indicator development.
CLINICAL AUDIT & IMPROVEMENT

Introduction:
Clinical audit is a systematic activity that applies knowledge about good clinical practice to day to day delivery of patient care. It is a quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit measures and the implementation of changes in practice if needed. Where indicated, changes are implemented at an individual, team, or service level and further measurement is carried out to confirm improvement of health care delivery. Clinical auditing involves assessing technical and clinical processes, procedures and/or protocols that directly impact the accuracy and reliability of the diagnosis and/or the patient’s treatment.

DQI 4.0 The imaging service improves clinical quality by documenting and auditing clinical processes and procedures.

DQI 4.1 Clinical processes and procedures are documented.
DQI4.1.1 Clinical processes and procedures are identified.
DQI4.1.2 Identified processes and procedures are documented through flowcharting and/or written procedures or protocols.

DQI 4.2 Clinical processes and procedures that are critical to the diagnostic and/or therapeutic outcome are validated and/or verified.
DQI4.2.1 Critical clinical processes and procedures are identified.
DQI4.2.2 Critical clinical processes and procedures are validated and/or verified.

DQI 4.3 A clinical audit program is established to:
DQI4.3.1 Ensure compliance with documented flowcharts and/or written procedures or protocols.
DQI4.3.2 Identify potential risks.
DQI4.3.3 Identify and prioritize opportunities for improvement.
DQI4.3.4 Ensure recommendations from audits are implemented.
DQI4.3.5 Disseminate results of audits.
DQI4.3.6 Ensure changes in practice are introduced.
DQI  4.4  The clinical audit program is planned and documented.

DQI4.4.1  □  Clinical processes and procedures subject to audit are identified.

Procedures for conducting clinical audits are documented and include for each clinical process and procedure subject to audit:

DQI4.4.2  □  name of the clinical process/procedure.
DQI4.4.3  □  type of clinical audit to be conducted.
DQI4.4.4  □  frequency of clinical audit.
DQI4.4.5  □  individual(s) appropriate to conduct the clinical audit.

Guidance: Individuals should not audit their own activities. Individuals should have practical knowledge and experience in the clinical process/procedure they are auditing.

DQI4.4.6  □  methodology to conduct the clinical audit.
DQI4.4.7  □  required documentation.
DQI4.4.8  □  individual/committee that results of the clinical audit are to be submitted to.

DQI4.4.9  □  Individuals involved in clinical auditing are provided with training.

DQI  4.5  In addition to clinical processes and procedures identified in DQI4.4.1, clinical audits are undertaken of the following key clinical processes:

for each modality:

DQI4.5.1  □  process for protocol development and adoption.
DQI4.5.2  □  use of structured reporting by interpreting physicians.
DQI4.5.3  □  corrected report audit to detect trends.
DQI4.5.4  □  at a minimum, weekly audit of unreported examinations to ensure all examinations have a written report and no exam goes unreported.

DQI4.5.5  □  image/examination quality review to provide technical staff with feedback.
DQI4.5.6  □  at a minimum, a monthly audit of the turnaround time for each reporting physician, by way of report to the medical leader.

DQI  4.6  Quality improvement activities are undertaken concurrent with patient diagnosis and treatment.

Intent: By undertaking quality activities concurrently with the diagnostic and treatment processes, individual patients can receive the benefits of clinical quality improvement immediately.

DQI4.6.1  □  Imaging medical practitioners and technical staff participate in multidisciplinary patient rounds.
DQI4.6.2  □  Imaging interpretations are correlated with other diagnostic examinations, pathology/surgical results and/or patient outcomes.
DQI4.6.3  □  Intended therapeutic effects are correlated with responses to therapy.
MEDICAL PEER REVIEW

Introduction:
Medical peer review is a systematic process undertaken to continuously improve patient safety and quality. Medical peer review contributes to improving processes and outcomes by providing performance feedback to individuals and the department as a whole. It is a proactive tool for identifying, tracking and resolving inappropriate clinical performance, discrepancies and medical errors during all stages of the diagnostic process. Peer review can be an internal process undertaken by peers within the organization, or a process external to the organization utilizing outside peers. There are many facets to medical peer review most of which are used to provide the most complete picture of medical performance. Peer review may be performed on a ‘case by case’ basis in relation to critical incidents, complaints or medical staff reappointment processes. It may also be performed on randomly selected cases as part of a systematic effort to monitor performance of practitioners as a proactive complement to routine performance data collection and review. Peer review may also be retrospective or prospective, and may involve the selection of special topics for in depth study either on an individual or departmental basis. It may also be contemporaneous with surveillance of actual clinical/ diagnostic performance which can be built into the daily work routine. In short, effective medical peer review generally involves all of the above. It is best performed within the context of research driven evidence, using clinical management tools to enable consistent evidence based practice.

DQI 4.7 There is an established medical peer review program.

DQI4.7.1 Medical leadership for the medical peer review program is assigned.

The medical leader is responsible to ensure:

DQI4.7.2 the medical peer review program is developed, implemented and monitored.
DQI4.7.3 the focus of the peer review program is improvement.
DQI4.7.4 the peer review program is integrated with other clinical audit and quality improvement activities of the imaging service and the organization.
DQI4.7.5 individual results of medical peer review are communicated to the medical practitioner.
DQI4.7.6 aggregate results of medical peer review are communicated to the imaging service medical practitioners.
DQI4.7.7 changes in practice are implemented, as necessary.
DQI4.7.8 where possible, there is participation in larger peer review databases to enable comparisons, benchmarking and statistical relevance.

Procedures for conducting medical peer review are documented and include:

DQI4.7.9 type of medical peer review to be conducted.
DQI4.7.10 volume of cases to be reviewed.
DQI4.7.11 frequency of review.
DQI4.7.12 individual(s) appropriate to conduct the peer review.

Guidance: Ideally, the individual conducting the peer review should have similar training, work in similar environments, and have similar proficiency and demonstrated competency in the medical specialty.

DQI4.7.13 methodology to conduct the peer review process.
The medical peer review program includes the following minimum elements:

**DQI 4.8**
- **DQI4.8.1** for each interpreting physician, a defined number of images and reports are randomly selected on a monthly basis for medical peer review.
- **DQI4.8.2** completeness and accuracy of reporting is assessed.
- **DQI4.8.3** correlation of interpretation with other diagnostic examinations, pathology/surgical results and/or patient outcomes.
- **DQI4.8.4** correlation of intended therapeutic effects with responses to therapy.
- **DQI4.8.5** the number of cases reviewed is recorded and reported.
- **DQI4.8.6** significant discrepancies between primary report and review are recorded and reported.
- **DQI4.8.7** inter-observer variability amongst the interpreting physicians in the department is evaluated at least annually.

A breast imaging medical outcomes audit is established to ensure reliability, clarity and accuracy in the interpretation of breast images.4

- **DQI4.9.1** The audit determines if follow-up of positive breast imaging assessments has occurred.
  
  **Guidance:** A positive assessment is defined as Suspicious abnormality- biopsy should be considered (Category 4 BI-RADS); or Highly suggestive of malignancy – appropriate action should be taken (Category 5 BI-RADS).

- **DQI4.9.2** The audit determines if follow-up of incomplete evaluations (Category 0 BI-RADS) has resulted in the correlation of pathology results with the interpreting physician’s findings.
- **DQI4.9.3** Analysis of the outcomes data is performed for each individual interpreting physician at least annually.
- **DQI4.9.4** Aggregated analysis of the outcomes data is performed for the imaging service at least annually.

An audit of CT colonography reports ensures reliability, clarity and effective communication of information to referring practitioners.5

- **DQI4.10.1** Final report indicates the likely biological significance of colonic findings to the referring practitioner and proposes an appropriate patient management strategy.
- **DQI4.10.2** Final report provides an indication of reader confidence (expressed as a percentage) for the presence of true pathology to help guide appropriate patient management and to provide a likelihood estimate of positive findings at subsequent endoscopic review.
DQI 4.10.3 □ For asymptomatic patients, guidance on polyp management is appropriately summarized.

*Guidance: Refer to Canadian Association of Radiologists CT Colonography Standards, January 2010, Appendix 2, Reporting and Data System for Asymptomatic (A) and Symptomatic (B) Patient Populations.*

DQI 4.10.4 □ For symptomatic patients, guidance is individualized according to clinical scenario including co-morbidity and risk benefit analysis for polypectomy.

*Guidance: Refer to Canadian Association of Radiologists CT Colonography Standards, January 2010, Appendix 2, Reporting and Data System for Asymptomatic (A) and Symptomatic (B) Patient Populations.*

### CLINICAL RISK MANAGEMENT

**Introduction:**
Clinical risk management involves the identification and management of risks associated with the diagnostic and patient care process. Clinical risks involve those aspects of the diagnostic and patient care process that could cause harm to a patient. An example of a high risk clinical process would be the administration of contrast media.

**DQI 5.0** Clinical risks are systematically identified and assessed, and action is taken to manage the risk.

**DQI 5.1** Clinical processes/procedures are assessed and identified as high, medium or low risk to cause harm.

*Guidance: The determination of the level of risk to a patient or individual considers the magnitude of potential harm, and the likelihood of occurrence.*

**DQI 5.1.1** □ Individuals involved in clinical risk assessment are provided with training.

A record is maintained of the assessment that documents:

**DQI 5.1.2** □ the name of the clinical process/procedure.
**DQI 5.1.3** □ the level of risk assigned to the clinical process/procedure.
**DQI 5.1.4** □ the name(s) of the individual(s) who conducted the risk assessment.
**DQI 5.1.5** □ the name(s) of the individual(s) who assigned the risk level.
**DQI 5.1.6** □ the date of assessment and assignment of risk level.

**DQI 5.2** High risk clinical processes are audited to manage risk.

**DQI 5.2.1** **M** □ High risk clinical processes are audited every six months.
**DQI 5.2.2** **M** □ Findings from audits are reviewed and analyzed.
**DQI 5.2.3** **M** □ Processes are changed as necessary to reduce risks.
UTILIZATION MANAGEMENT – CLINICAL EFFECTIVENESS

DQI  6.0  The imaging service participates in utilization management activities.

DQI  6.1  The appropriateness of requested imaging services is assessed.

DQI6.1.1  Clinical indications for requesting examinations are made available. 
Guidance: Canadian Association of Radiologists (CAR) published guidelines available through the CAR website located at: http://www.car.ca.

DQI6.1.2  Processes are in place to assess modality and examination appropriateness.

PERFORMANCE INDICATORS

Introduction:
In order to improve the quality and safety of services provided, it is important to measure and analyze the performance of processes and then use that data to make improvements. Most organizations have limited resources and can not collect data to monitor everything. Organizations must choose clinical and operational process and outcome indicators most important to monitor the quality and safety of the services they provide.

DQI  7.0  Indicators are used to monitor operational and clinical performance.

DQI  7.1  Indicator sets are developed and defined to monitor and improve performance. These indicators:

DQI7.1.1  are selected to monitor high risk and high volume processes.
DQI7.1.2  are used to identify current status and areas for improvement.
DQI7.1.3  have accepted definitions acknowledged by the imaging community, provincial and/or federal governments.
DQI7.1.4  are rate-based (indicator has a numerator and denominator) to allow for comparison.
DQI7.1.5  have defined numerators, denominators, exclusion criteria, and period of reporting.
DQI7.1.6  allow for internal and external comparison.
DQI7.1.7  give direction to quality improvement activities.

DQI  7.2  Indicator sets for monitoring operational performance may include but are not limited to:

for medical staff:

DQI7.2.1  frequency of visits by the medical leader to facilities with offsite medical leadership.

for human resources:

DQI7.2.2  staff competency assessment rate.
DQI7.2.3  staff competency assessment rate for performance of delegated medical acts.
DQI7.2.4  overtime rate.
DQI 7.3 Indicators for monitoring clinical performance may include but are not limited to:

DQI 7.3.1 procedural complication rate, for each modality.
DQI 7.3.2 mislabeled sample rate, for each modality.
DQI 7.3.3 iodinated contrast extravasation during an IV contrast enhanced imaging procedure rate.\(^6\)
DQI 7.3.4 median minutes from time patient presents with stroke symptoms to CT examination.\(^7\)
DQI 7.3.5 median minutes from time patient presents with stroke symptoms to the time CT preliminary report is completed and reported.\(^8\)
DQI 7.3.6 percentage of final reports for carotid imaging studies performed that include direct or indirect reference to measurements of distal internal carotid diameter for stenosis measurement.\(^9\)
DQI 7.3.7 percentage of patients undergoing diagnostic mammograms that are classified as “suspicious” or “highly suggestive of malignancy” with documentation of direct communication of findings to the referring practitioner within 3 business days of exam interpretation.\(^10\)
DQI7.3.8 percentage of final reports for CT examinations performed with documentation of use of appropriate radiation dose reduction devices, or, manual techniques for appropriate moderation of exposure.

DQI7.3.9 percentage of final reports for procedures using fluoroscopy that include documentation of radiation exposure or exposure time.

DQI7.3.10 percentage of final reports for all patients, regardless of age, undergoing bone scintigraphy that include physician documentation of correlation with existing relevant imaging studies (e.g. x-ray, MRI, CT) that were performed.

DQI7.3.11 wait times for high priority conditions requiring sequential diagnostic imaging examinations/procedures.

Intent: There are times when patients can wait an inordinate length of time because of sequential waits for certain imaging examinations/procedures, when each is booked in sequential fashion with its own individual waiting time. With certain conditions such as cancer the disease continues to advance in stage and this can result in treatment decisions having to be altered with possible negative consequences for outcomes.

DQI 7.4 Data is collected to monitor performance.

DQI7.4.1 Data is collected for indicators identified as most important to monitor the quality and safety of the services.

DQI7.4.2 The frequency of data collection is identified for each indicator.

DQI7.4.3 Data is compiled in a usable format.

DQI7.4.4 Statistical tools and techniques are used to analyze and present the data.

DQI7.4.5 Data is analyzed over time to identify trends and variation in performance.

DQI7.4.6 Performance is compared with external sources.

DQI 7.5 Quality improvement initiatives are planned, implemented and evaluated.

DQI7.5.1 Performance data is used to identify and prioritize improvement opportunities.

DQI7.5.2 Appropriate people (staff, stakeholders, clients) are involved in improvement initiatives and are assigned responsibilities.

DQI7.5.3 Clear, measurable statements are developed explaining what is to be accomplished with each improvement initiative.

DQI7.5.4 Plans for the improvement initiative are developed, documented and implemented.

DQI7.5.5 Post-implementation, the improvement initiative is evaluated to ensure the initiative resulted in improvement.

DQI7.5.6 Action is taken if the initiative does not achieve or sustain planned improvements.

DQI7.5.7 Improvement activity that includes preventive action includes the application of controls to ensure effectiveness.

DQI7.5.8 The results of improvement initiatives are documented and communicated to staff, stakeholders and clients.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


Joint Commission 2009 Hospital Accreditation Standards. Illinois, USA.


The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.


Single Health Care Services Quality Improvement Checklist. Texas Department of Insurance.


ISO 15189: Medical Laboratories – Particular requirements for quality and competence.
SPECIFIC DOCUMENTS REFERENCED


3. Health Canada Safety Code 33, Section 3.2.2


ACCREDITATION STANDARDS 2010

INFORMATION MANAGEMENT

Introduction:
The imaging service generates management and clinical information that must be managed. Depending on the imaging service, the information management processes may be basic or complex; paper-based; both paper and electronic; or fully electronic information systems. Regardless of the process used, management and clinical information must be accurately captured and generated by the imaging service to ensure staff and clients have access to necessary and appropriate information.

Definition: Information systems are defined as an organized combination of hardware, software, communication network and data resources that collects, transforms and disseminates information in an organization. Common examples include Radiology Information Systems and PACS.

The Information Management section of the accreditation standards addresses:

- Planning
- Confidentiality
- Medical records
- Document control
- Retention of documents and records

PLANNING

DIM 1.0 Plans for managing clinical and management information are effective, integrated and coordinated.

Intent: Planning is one of the most critical components of information management and requires the collaborative involvement of all levels and areas of the organization. The imaging service’s plan for information management considers all the information used by the imaging service; both clinical and management information. Planning includes the assessment of the system and resources necessary to implement and maintain the current and future information needs of the imaging service.
DIM 1.1  The information management plan for the imaging service includes:

DIM1.1.1 participation of clinical, management and technical staff.
DIM1.1.2 identification of the information needs of administrative leaders.
DIM1.1.3 identification of the information needs of clinical leaders.
DIM1.1.4 identification of processes to manage management and clinical information.
DIM1.1.5 activities for managing interruptions to information systems so that access to information is maintained.
DIM1.1.6 priority of current and future information needs.
DIM1.1.7 alignment with organization wide information management processes and plans.
DIM1.1.8 communication of plans and priorities to the administration of the organization.
DIM1.1.9 adequate resources secured for implementation and sustainability of information management processes.

DIM 1.2  Key stakeholders participate in making effective decisions for information systems.
Intent: Information systems will require the participation of key stakeholders and review of the components in the information system on a frequent basis. The key to a successful RIS implementation is having a knowledgeable and effective team for planning, implementing and sustaining the systems.

Key participants include:

DIM1.2.1 imaging service physicians.
DIM1.2.2 imaging service informatics specialists.
DIM1.2.3 management /administrators.
DIM1.2.4 technologists.
DIM1.2.5 referring physicians.
DIM1.2.6 service specialists.

DIM 1.3  The imaging service regularly reviews processes for the management of information that includes:

DIM1.3.1 organization (e.g. standardization and categorization).
Intent: The use of uniform data sets to standardize data collection throughout the organization and the standard use of terminology, abbreviations, symbols etc is essential for effectively managing information.
DIM1.3.2 collection (e.g. capture or acquisition).
DIM1.3.3 communication.
DIM1.3.4 archive and storage.
DIM1.3.5 access, security and confidentiality.
DIM1.3.6 information system performance.
DIM1.3.7 display.
DIM1.3.8 diagnostic reports linked with examinations.
DIM 1.4 Users of paper-based information processes are provided training appropriate for their roles and responsibilities.

DIM1.4.1 M Training for users is provided prior to use of information processes.
DIM1.4.2 There are provisions for ongoing information user training.
DIM1.4.3 Documentation is provided to users as needed.

DIM 1.5 Users of information systems are provided training appropriate for their roles and responsibilities.

DIM1.5.1 M Training for users is provided prior to use of information systems.
DIM1.5.2 There are provisions for ongoing information user training.
DIM1.5.3 Documentation is provided to users as needed.

DIM 2.0 Information is available and used to make effective decisions.

DIM 2.1 Information management processes used to support clinical and management decisions allow the imaging service leaders to:

DIM2.1.1 M access data in a timely fashion.
DIM2.1.2 M gather, link and combine data and information from multiple sources.
DIM2.1.3 M assess and compare current data to historical data.
DIM2.1.4 M determine costs associated with service delivery.
DIM2.1.5 M manage resource utilization.
DIM2.1.6 M exchange information with other organizations, as appropriate.
DIM2.1.7 M routinely obtain clinical and management reports.
DIM2.1.8 M obtain custom designed reports, if necessary.

DIM 3.0 Continuity of information management processes ensures the availability of information.

DIM 3.1 The imaging service is prepared for events that could impact the availability of information.

DIM3.1.1 M There is a documented disaster recovery plan and associated risk assessment for recovery and access to data.

Guidance: For non-computerized/film based systems the documented recovery plan should be more basic than for RIS and PACS.

DIM3.1.2 The disaster recovery plan has been tested.
DIM3.1.3 M For information systems, database and diagnostic image back-up is performed daily and the backup is securely located in a separate physical location.
DIM3.1.4 M Data stored on-site and off-site is accessible, but protected from unauthorized access and safeguarded against harm (e.g. water, fire, etc.).
**ACCREDITATION STANDARDS**

**INFORMATION MANAGEMENT**

**DIM 3.2** Downtime procedures are available and communicated to staff.

*Intent: Downtime procedures are required for both scheduled and unscheduled system downtime.*

- **DIM3.2.1 M** Unscheduled (e.g. system malfunction or failure) downtime procedures are communicated to staff.
- **DIM3.2.2 M** Users know how to contact support staff in the event of system and/or equipment malfunction.
- **DIM3.2.3** On-site or consultant service specialists are available in a timely manner in the case of system malfunctions.
- **DIM3.2.4 M** Documented downtime procedures are available and communicated to staff.
- **DIM3.2.5** Adequate resources are made available for downtime recovery.

Designated staff and/or service specialists are available and perform the following:

- **DIM3.2.6** assess and participate in problem-solving.
- **DIM3.2.7** initiate repair and follow-up.
- **DIM3.2.8** data reconciliation and image corrections.
- **DIM3.2.9** The reasons for, and frequency of, information system downtime is documented.

**CONFIDENTIALITY**

*Introduction*

The privacy of health information is a critical information management concern. Privacy of health information applies to electronic, paper, and verbal communications. Protecting the privacy of health information is the responsibility of all staff. Organizations protect privacy by limiting the use of information to only what is needed to provide care, treatment, or services.

Clinical information is kept confidential when the information is secure and its use is limited. A confidentiality violation occurs when an individual is able to bypass security measures and systems to gain access to health information.

**DIM 4.0** The imaging service protects the confidentiality of data and information.

**DIM 4.1** Patient confidentiality and information is protected through policies and procedures.

*References: Freedom of Information and Protection of Privacy Act for the public sector and the B.C. Personal Information Protection Act for the private sector. Security and confidentiality of personal information must be protected when using electronic information systems. Network and software security protocols are required to protect the confidentiality of images, diagnostic reports and other data. See also Imaging Informatics Accreditation Standards.*

- **DIM4.1.1 M** Data access is restricted, controlled and monitored.
Policies are in place that specify the level of access that is permitted for each category of staff, including information recorded in patient files from other service areas in the organization.

**Intent:** Personal information is accessed only by those who are engaged in the primary purpose for which the information was captured.

Authorized staff maintains user access and restriction controls.

Unauthorized user access is monitored.

There is a policy that addresses how to handle unauthorized users.

For computer-based systems there is a policy for password confidentiality and use.

Generic login accounts are not used.

There is a procedure that ensures linkage between images and patient identification is removed before any secondary use is permitted (e.g. records used for research or teaching purposes are anonymized).

Security incidents are reported, documented, investigated and resolved. Actions are taken to prevent recurrence.

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**The service has policies for the release or destruction of data:**

There is a policy for the use and disclosure of personal information:

- to patients.
- to family members.
- to health care professionals.
- to other service areas within the organization.
- to other organizations.
- for research and education purposes.
- for legal reasons.

There is a policy that identifies personal information that can be distributed by the following:

- electronic mail.
- facsimile.
- web-based technology.

Personal information that is subject to restricted access is identified.

Confidential data is destroyed appropriately.

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**The imaging service continually educates information users about processes to ensure confidentiality of data.**

Processes to ensure the confidentiality, security and integrity of data are provided at the beginning of employment as well as on an ongoing basis.

Education is provided to all information users and includes:

- release of patient information.
- legal responsibilities regarding confidentiality.
- possible consequences of breaching confidentiality.
- reporting, documenting and investigating security incidents.
MEDICAL RECORDS

Introduction
The medical record is an important method of communication for all members of the health care team. The patient’s medical record contains all the clinical data and information related to the patient’s diagnostic procedures and treatments. The patient’s medical record functions not only as a historical record of a patient’s diagnostic procedure and treatment, but also as a method of communication between physicians and staff. These records facilitate the continuity of care and aid in clinical decision-making. Medical records may be one component of the facility’s health record.

Definitions:
The medical record includes all the clinical data and information related to the patient’s diagnostic procedure and treatment. The medical record includes all relevant documents for the examination/procedure including, but not limited to: master patient file (envelope) the request for consultation, in-house worksheets, images and associated quantitative data, reports, etc.

Patient identifiers: Information directly associated with an individual that reliably identifies the individual as the person for whom the service or treatment is intended. Acceptable identifiers may include the individual’s first and last name, an assigned identification number, or other person-specific identifiers.

DIM 5.0   The imaging service maintains complete and accurate medical records.
See also Global Modality Accreditation Standard, GM 7.0 and modality-specific accreditation standards.

DIM 5.1   The medical record includes accurate patient identification information.

DIM5.1.1 M □ The facility uniquely identifies the patient and examinations performed.
Guidance: There is a system for uniquely identifying patients and records used from the time the patient presents through all stages of the examination. The facility ensures that correct patient identification is maintained on all records, including reports. Every patient has a unique facility-issued patient identifying number and each examination is uniquely associated to that patient.

DIM5.1.2 M □ The patient name, patient identifying number and facility name are clearly identified on the master file/patient medical record.
Guidance: The master patient file is appropriately identified for film-based systems and the medical record for electronic systems.
### ACCREDITATION STANDARDS

#### INFORMATION MANAGEMENT

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<tr>
<th>DIM 5.2</th>
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</table>
| DIM5.2.3 | M  | Audits are performed to identify the individuals who have viewed incorrect patient information.  
**Guidance:** Follow-up notification should be provided to alert individuals that they have viewed incorrect patient information. This notification should be documented. |
| DIM5.2.4 | M  | For PACS systems, there is a policy that addresses data deletion and correction procedures.  
**Intent:** All images captured, whether on film or using digital image data management systems, must remain with the medical record unless they are rejected by the operator for valid pre-defined quality issues. For digital image data management systems this is critical as once images are sent to PACS they may have been viewed by information users and clinical decisions made based on those images. |
| DIM5.2.5 | M  | Information from other organizations that is entered manually is verified for accuracy prior to user access.  
**Intent:** There are risks associated with manual re-entry and whenever possible this should be discouraged. |
| DIM5.2.6 | M  | Information captured electronically from other organizations is verified for accuracy prior to user access.  
**Intent:** There can be risks with associating external information with internal patient medical records. Procedures should exist to ensure data integrity and also to deal with discrepancies in information provided from external organizations. |

<table>
<thead>
<tr>
<th>DIM 5.3</th>
<th>Current and historical clinical data can be accessed by staff and clients when needed.</th>
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</table>
| DIM5.3.1 | M  | Images are available when the patient moves from one facility to another. When feasible, a copy of the final report accompanies the images.  
**Guidance:** Stored images and diagnostic reports can be made available in an appropriate format (e.g. printed film, CD-ROM, etc.) or are readily accessible in soft copy for off-site review. |
| DIM5.3.2 |  | Digital and hard-copy image storage ensures an orderly and legible permanent record that is available without delay. |
| DIM5.3.3 |  | Digital storage allows for the availability and electronic linking of multiple studies and diagnostic reports for individual patients. |
| DIM5.3.4 |  | Data is retrievable “on-line” for a designated period of time, depending on the needs of the facility. |
| DIM5.3.5 |  | “On-line” storage capacity planning is periodically performed to ensure the storage needs of the facility are maintained. |
| DIM5.3.6 | M  | There is sufficient storage for hardcopy records (including films and paper). |
ACCREDITATION STANDARDS
INFORMATION MANAGEMENT

DOCUMENT CONTROL

DIM 6.0  The imaging service defines and maintains procedures to control key operational documents.
Guidance:  This standard refers to key documents such as operational policies and procedures.

DIM 6.1  The imaging service defines and maintains document control procedures.

DIM6.1.1  M □ There are defined authorities, procedures and processes for the maintenance and review of documents

DIM6.1.2  □ There is a list of controlled documents that identifies the current version and distribution.
Guidance:  In some organizations and facilities, a document is distributed to one or more other locations or areas. Examples of this include clinics in hospitals, regional systems and off-site sample collection stations.

Documents are well marked and uniquely identified to include:

DIM6.1.3  M □ title.
DIM6.1.4  M □ current revision date or version.
DIM6.1.5  M □ identification of the individual responsible for the authorization and release of the document (e.g. medical leader).

DIM6.1.6  M □ Documents follow a standardized format.
DIM6.1.7  M □ Only current authorized versions of documents are available for active use and invalid or obsolete documents are promptly removed from all points of use.
DIM6.1.8  M □ Operational documents are archived for later reference and archival time is defined by the medical leader.
DIM6.1.9  M □ Where hand written amendments are permitted, the amendments indicate date of entry and identification of the person making the change.
DIM6.1.10 □ Hand written amendments are permanently incorporated into procedures, and documents are reissued within 6 months.
DIM6.1.11 □ There are established procedures on how to make changes to documents in computerized systems.
DIM6.1.12 □ Supplemental information or job aids are dated and associated to the full procedure.
Guidance:  Information written on separate pieces of paper, sticky notes and other unauthorized material must be linked to a policy, procedure or process. These job aids are not a substitute for information that should be contained in written procedures.

DIM 6.2  There are processes to address changes in procedures and documentation

DIM6.2.1  M □ New or revised policies, procedures, protocols and/or positioning manuals are communicated and available to staff.
DIM6.2.2  M □ Communication is recorded.
RETENTION OF DOCUMENTS AND RECORDS

DIM 7.0 The imaging service retains documents and records.

DIM 7.1 Retention times for images and diagnostic reports complies with the service’s policy or provincial requirements (e.g. as defined under the Health Professions Act), whichever is longer.

DIM7.1.1 M ☐ Adult images and diagnostic reports are retained at a minimum for six years, plus the current year.

DIM7.1.2 M ☐ Pediatric images and diagnostic report retention complies with adult retention criteria, in addition to “past the age of majority” (19).

DIM7.1.3 M ☐ The service complies with any individual circumstances noted for permanent extended periods of retention (e.g. tobacco litigation).

Guidance: The provincial tobacco litigation directive for retention applies only to public Health Authority facilities.

Retention times are identified for the following:

DIM7.1.4 ☐ request forms.
DIM7.1.5 ☐ examination protocols.
DIM7.1.15 ☐ quality improvement records.
DIM7.1.16 ☐ records of internal and external audits.
DIM7.1.17 ☐ complaints and actions taken.
DIM7.1.18 ☐ adverse event and/or critical incident reporting forms and records of investigation.
DIM7.1.19 ☐ staff training and orientation records.
DIM7.1.20 ☐ staff competency records.

DIM 7.2 Personal dosimeter records are retained.

DIM7.2.1 M ☐ All personal dosimetry records are maintained for the lifetime of the facility.

Guidance: WorkSafe BC also requires retention of personal dosimeter records for the period of employment plus ten years. This will address situations where an imaging facility is relocated.
DIM 7.3  Equipment testing records and survey reports are retained.

DIM7.3.1 M ☐ Acceptance testing records are retained for the lifetime of the equipment.
DIM7.3.2 M ☐ Radiation surveys are retained for ten (10) years.
DIM7.3.3 M ☐ Imaging equipment Q.C. records are retained for a minimum of three years.

*Intent:* As far as practicable, recorded data must be indicated as data points on a control chart when the measurement is made. In this form, trends can be more easily detected. A log book or other easily identifiable method of recording must be used and records must be kept for a minimum of 3 years.

DIM7.3.4 M ☐ Preventative maintenance records are retained for the lifetime of the equipment.
DIM7.3.5 M ☐ Mammography medical physicist’s reports are retained for three years.
DIM7.3.6 M ☐ For mammography, one monthly sample quality control phantom film is retained for a minimum of 3 years.
DIM7.3.7 M ☐ Personal protective equipment records are retained for the lifetime of the equipment.
DIM7.3.8 M ☐ Processor quality control charts are retained in the Quality Control records for a minimum of 1 year.
DIM7.3.9 M ☐ Nuclear medicine radiation survey and monitoring records are retained indefinitely until written permission is obtained from the CNSC to discard them.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:

Diagnostic Accreditation Program Accreditation Standards 2005. British Columbia, Canada

Diagnostic Accreditation Program Accreditation Standards 2007. British Columbia, Canada

Joint Commission 2009 Hospital Accreditation Standards. Illinois, USA.
ACCREDITATION STANDARDS 2010

IMAGING INFORMATICS

Introduction:
The Imaging Informatics Accreditation Standards address electronic information systems and digital image data management systems. Digital image data management systems cover the spectrum of a single-modality or single-use system to a complete Picture Archiving and Communication System (PACS). Most teleradiology systems are now PACS systems with network connections with only a few remaining point-to-point systems. These standards address concepts touching every aspect of the imaging chain from image acquisition, communication, distribution and archiving to image processing, analysis and display.

The implementation of informatics concepts will enable a patient-centric, evidence-based healthcare delivery environment that promotes and enhances patient safety and the quality and efficiency of care, while reducing medical errors.

Definition: Information systems are defined as an organized combination of hardware, software, communication network and data resources that collects, transforms and disseminates information in an organization. Common examples include Radiology Information Systems and PACS.

The Imaging Informatics section of the accreditation standards addresses:

- Equipment and integration
- Digital image data management - PACS and teleradiology
  - Equipment
  - Quality assurance

EQUIPMENT AND INTEGRATION

Introduction:
The integration of information systems requires communication standards and frameworks to ensure system interoperability.
Definitions:

Health Level 7 (HL7) is the communications protocol used in virtually all information systems. Hospital Information Systems (HIS) and Radiology Information Systems (RIS) installations today are designed to use the widely accepted HL7 standard introduced by the Healthcare Information and Management Systems Society (HIMSS). The HL7 standard allows for communication and investigation between information systems.

Digital Imaging and Communication in Medicine (DICOM) is the standard for interconnection of digital imaging devices and software developed and sponsored by the ACR-NEMA (American College of Radiology – National Electrical Manufacturers Association) committee, consisting of a standard image format and a standard communications protocol.

Integrating the Healthcare Enterprise (IHE) is an initiative by healthcare professionals and industry to improve the way computer systems in healthcare share information. IHE promotes the coordinated use of established standards such as DICOM and HL7 to address specific clinical needs in support of optimal patient care.

II 1.0 Information systems are monitored and maintained to ensure reliable and timely information.

II 1.1 Hardware and software meets established standards and ensures reliable and timely delivery of information.

II1.1.1 M □ High-availability servers exist to provide the maximum possible access to the applications.

II1.1.2 □ Service level agreements are in place, as per facility requirements and are reviewed on an annual basis.

II 1.2 Processes are in place to monitor system performance.

II1.2.1 M □ A designated individual is responsible for regularly monitoring and evaluating the effective management of the system(s).

The designated individual monitors and evaluates:

II1.2.2 □ continuous system checks.

II1.2.3 □ functionality verification of system monitoring tools.

II1.2.4 □ network connectivity checks.

II1.2.5 □ workstation and peripheral equipment checks.

II1.2.6 □ inspection of the physical environment of the servers.

II1.2.7 □ audit logs are captured and saved.

II1.2.8 □ There are processes in place to analyze system performance and productivity.

II1.2.9 □ System support calls are recorded, monitored and retained.
<table>
<thead>
<tr>
<th>II.1.3</th>
<th>There is a preventive maintenance program.</th>
</tr>
</thead>
<tbody>
<tr>
<td>II.1.3.1</td>
<td>M Preventive maintenance is performed by trained and competent staff.</td>
</tr>
<tr>
<td>II.1.3.2</td>
<td>Applicable Operating System updates and patches as well as antivirus updates are installed, when available.</td>
</tr>
<tr>
<td>II.1.3.3</td>
<td>M Servers are maintained in accordance with the manufacturer’s recommendations.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>II.1.4</th>
<th>Compliance to established standards ensures reliable and timely delivery of information.</th>
</tr>
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<tbody>
<tr>
<td>II.1.4.1</td>
<td>There is HL7 integration with HIS/RIS or RIS and PACS.</td>
</tr>
<tr>
<td>II.1.4.2</td>
<td>M There is compliance with the DICOM standard for all new digital imaging equipment.</td>
</tr>
<tr>
<td>II.1.4.3</td>
<td>M Communications protocols, file formats and compression conforms to the current DICOM 3.0 network standard.</td>
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</tbody>
</table>
| II.1.4.4 | M Network and software security protocols are in place to protect the confidentiality of images, diagnostic reports and other data.  
**Intent:** Systems provide network and/or software protocols to protect the confidentiality of the patient’s record(s), image(s), interpretation(s) and other data and ensure that the system is secure and used only on an as needed basis by those authorized by the patient in accordance with provincial privacy of information legislation and CMA guidelines. |

| II.1.4.5 | New equipment and software supports the IHE technical framework.  
**Guidance:** For digital mammography, see Mammography Accreditation Standards DMII 2.2.1, DM2.2.2, DM2.4.1, DM2.4.2.  
**Intent:** The IHE Technical Frameworks are a resource for users, developers and implementers of healthcare imaging and information systems. They define specific implementations of established standards to achieve effective systems integration, facilitate appropriate sharing of medical information and support optimal patient care. There are numerous IHE integration profiles that include profiles for workflow, profiles for content, profiles for presentation, and profiles for infrastructure. An example of a profile that transfers information from one system to another and eliminates the need to re-enter information independently on each system is the Scheduled Workflow (SWF). The SWF integrates ordering, scheduling, imaging acquisition, storage and viewing for exams. Another example, Portable Data for Imaging (PDI) allows reliable interchange of image data and diagnostic reports on CDs for importing, printing, or optionally, displaying in a browser.  
**II.1.4.6** | M Multiple vendors are brought together in conference calls or meetings to facilitate the coordination of integration efforts. |
II 1.5  Test procedures are performed to ensure accurate and consistent information exchange.

*Intent:* Test procedures are performed when new systems are installed or changes are made to existing systems (e.g. system upgrades, maintenance, and repairs (software/hardware).

II1.5.1  M □ System-wide testing covers a wide range of HIS/RIS message types and procedures, in addition to covering as many modalities as possible.

II1.5.2  M □ There is a process to check the effect of software changes on the imaging modalities and/or PACS prior to clinical use.

This includes, but is not limited to:

II1.5.3  M □ modality DICOM transfer verification.

II1.5.4  M □ DICOM Modality Worklist and RIS verification.

II1.5.5  M □ the validation of measurement tool accuracy.

II1.5.6  □ A test environment exists to ensure all upgrades, maintenance, and repairs (software/hardware) can be installed, validated and training completed without interfering with the production module.

DIGITAL IMAGE DATA MANAGEMENT- PACS AND TELERADIOLOGY

*Introduction:*

These standards are applicable to any system of digital image data management, from a single-modality or single-use system to a complete PACS. Most teleradiology systems are now PACS with network connections with only a few remaining point-to-point systems.

Tele-radiology and PACS involves the electronic acquisition, storage and transmission of diagnostic images from one location to another for the purposes of interpretation and/or consultation.

At present the standard for fluoroscopy is to have a radiologist performing the examination. There may be rare exceptions when fluoroscopic images can be transmitted for interpretation via PACS/teleradiology.

Digital mammography standards are still evolving. The digital mammography equipment and electronic display devices QC standards are included in the Mammography Accreditation Standards.
EQUIPMENT

Definitions:

There are three categories or systems for digital image data when used for rendering the official interpretation:

*Small matrix systems* (computed tomography [CT], magnetic resonance imaging [MRI], ultrasound, nuclear medicine, digital fluorography, and digital angiography).

*Large matrix systems* (digital radiography and digitized radiographic films).

*Extra large matrix systems* (digital mammography). Refer to Mammography Accreditation Standards.

There are two classes of display systems: *primary* and *secondary systems*.

Primary display systems are those used for the interpretation of medical images. In prior literature, primary display systems have sometimes been referred to as “diagnostic” monitors.

Secondary display systems are those used for viewing medical images for purposes other than for providing a medical interpretation. In this class of displays, there are also operator’s console monitors and quality control (QC) workstations, display devices that are commonly used to “adjust” the images before they are sent to PACS or hard-copy printers. As the performance of these systems (especially their luminance response) directly impacts image presentation at other display devices, their performance needs to maintain a minimum level of acceptability. Ideally, they comply with the luminance response requirements of primary displays. In other aspects, they may be treated as secondary class displays. In prior literature, secondary display systems have sometimes been referred to as “clinical” monitors.

II  2.0 Appropriate equipment is used for acquisition, communication, display, and storage of images.

Introduction: For all digital image data, the initial data set provides full resolution data for processing, manipulation, and subsequent display.

II  2.1 Digitization equipment is capable of digital resolution acceptable for rendering the official interpretation.

Intent: For most digital imaging modalities the initial image acquisition is commonly a direct image capture where the entire image data set from the modality is sent to PACS, using the DICOM standard. In occasional circumstances, the digital conversion of hard copy or analogue images may be necessary to transmit to PACS. The laser scanning digitizer used does not reduce the digital resolution below that considered an acceptable threshold.

II2.1.1 M ☐ For small matrix systems, the individual image is digitized to a matrix size as large as or larger than that of the original image by the imaging modality.

II2.1.2 M ☐ For small matrix systems, images are digitized to a minimum of 8 bits pixel depth.
II 2.1.3 M □ For large matrix systems, images are digitized to a matrix size corresponding to 2.5 lp/mm (200 micron) or greater, measured in the original detector plane.

II 2.1.4 M □ For large matrix systems, images are digitized to a minimum of 10 bits pixel depth.

II 2.2 Acquisition equipment is capable of capturing demographic as well as imaging information that includes, but is not limited to:

Intent: The initial image acquisition information is associated with the images when transmitted and is formatted in the appropriate DICOM fields.

See also the Global Modality Accreditation Standards, GM 7.1.

II 2.2.1 M □ patient name.

II 2.2.2 M □ identification number.

II 2.2.3 M □ date and time of acquisition.

II 2.2.4 M □ name of acquisition facility (site or origin).

II 2.2.5 M □ type of examination.

II 2.2.6 M □ patient or anatomic part orientation (e.g. right, left, superior, inferior etc.).

II 2.2.7 M □ amount and method of data compression.

II 2.3 PACS/teleradiology systems ensure transmitted information from the site of origin is intact at the reporting facility. Inter-facility PACS/teleradiology ensures:

Intent: It is to be stressed that the images at the reporting facility can only be as good as the images captured at the site of origin (acquisition facility). There is to be no loss of clinically significant information and image quality is to be the same at the site of origin and the reporting facility. It is necessary that an imaging physician or delegate be at the acquisition facility on a regular basis to assess the quality and safety of service (see Medical Staff Accreditation Standards, DMS1.2). The use of PACS/teleradiology does not reduce the responsibilities for the management and supervision of the practice of medicine by a qualified imaging physician. This includes appropriateness screening, supervision of technical standards and procedures, image interpretation and consultation. This safeguard allows PACS/teleradiology to be equivalent to on-site imaging service in selected instances. Incidence of complications and adverse events are reviewed to identify opportunities to improve patient care.

II 2.3.1 M □ the patient’s history and other data are available at the reporting facility.

Guidance: Data may be transmitted by fax or by some other means. The ability to obtain prior examinations and reports is necessary for all interpretations; both for film based systems and digital systems.

II 2.3.2 M □ direct communication between technical staff and interpreting physicians is documented.

II 2.3.3 M □ the transmission system has an error-checking capability.

II 2.3.4 M □ compression, if used, is user selectable.

II 2.3.5 M □ capability for the selection of the image sequence for transmission and display at the reporting facility.
II  2.4  Primary display systems used for display of small matrix systems have at a minimum:
Guidance: Primary display systems commonly allow the viewing of multi-modality examinations of images of various matrix sizes on one system. It is possible to have less stringent contrast requirements for certain modalities or diagnostic tasks (e.g. display of only ultrasound and nuclear medicine images). If so, however, it should be taken into consideration that a display that is originally intended for a certain modality might be used to view images from another modality in the future, so it should meet the more stringent set of requirements for that display system.

II 2.4.1  M 0.5K x 0.5 K (0.3 mega pixel) monitor or better.
II 2.4.2  M a luminance ratio of at least 250:1 under normal reading conditions.
II 2.4.3  M a luminance of 170 cd/m² under normal reading conditions.

II 2.5  Primary display systems used for display of large matrix systems have at a minimum:

II 2.5.1  M 1600 x 1200 (1.9 mega pixel) monitor or better.
II 2.5.2  M a luminance ratio of at least 250:1 under normal reading conditions.
II 2.5.3  M a luminance of 170 cd/m² under normal reading conditions.

II 2.6  Primary display systems accurately reproduce the original examination and include the minimum functional features of:

II 2.6.1  M image sequence selection.
II 2.6.2  M accurate association of the patient and study demographic data with the images.
II 2.6.3  M brightness and contrast and/or interactive window and level function.
II 2.6.4  M capability of inverting the gray-scale values of the displayed image.
II 2.6.5  M zoom (magnification) function.
II 2.6.6  M rotation and flipping the displayed images with preservation of orientation of patient labeling.
II 2.6.7  M capability to calculate and display accurate linear measurements and pixel value determinations in values appropriate for the modality (e.g. Hounsfield values for CT images), if those data are available and can be calibrated to the acquisition device.
II 2.6.8  M capability of displaying prior image compression ratio, processing, or cropping.

the following elements of display:

II 2.6.9  M matrix size.
II 2.6.10  M bit depth.
II 2.6.11  M total number of images acquired in the study.
II 2.6.12  M clinically relevant technical parameters.
II 2.7 Primary display system reporting environments are established considering patient confidentiality, ergonomics and environmental issues.

II2.7.1 Environments are optimized to avoid screen glare, extraneous light and reflections.  

*Intent: Lighting in the reading room is controlled to eliminate reflections in the monitor.*

II2.7.2 M Ambient light is low and consistent.  

*Guidance: For mammograms and X-rays it is recommended that the ambient light within the reading environment is less than 10 lux. For other modalities such as CT, MRI, NM and US it is recommended that the ambient light within the reading environment be in the range of 15–60 lux. An appropriate ambient level is to be determined based upon these recommendations.*

II2.7.3 M Lighting controls are used, particularly in environments where many kinds of images are being read and/or hardcopy and softcopy images are being interpreted in the same environment.

II2.7.4 M Incandescent lights are utilized, with “natural” light simulation color filters, if possible.

II2.7.5 M Display workstations are placed with consideration for optimal ergonomics.

II2.7.6 M Display workstations are in locations that do not compromise patient confidentiality.

II2.7.7 M Users are taught to exercise reasonable care and caution to protect any clinical information being displayed on computer screens from casual observance.

II2.7.8 M Display workstations are configured to automatically log-off when inactive for a predetermined length of time.

II2.7.9 Environments are optimized for environmental considerations such as heat and noise.

II 2.8 M The primary display system specifications, reporting environments and network and software security protocols for non-hospital (e.g. clinic or home reporting) settings meet the requirements as listed in II1.4.4, II 2.3, II2.4, II2.5, II2.6, and II2.7.  

*Note: See also Equipment and Supplies Accreditation Standards, DES 3.5 and DES 3.6 for QC procedures.*

II 2.9 Secondary display system reporting environments are established considering patient confidentiality, ergonomics and environmental issues.

II2.9.1 M Ambient light is low and consistent.

*Guidance: Some environments are challenged in controlling ambient lighting (e.g. operating rooms).*

II2.9.2 M Display workstations are in locations that do not compromise patient confidentiality.

*Guidance: Display workstations should be located far enough from casual observance so that confidential patient information cannot be seen by patients, visitors and other non-responsible staff.*  

*See also II2.9.3.*

II2.9.3 M Users are taught to exercise reasonable care and caution to protect any clinical information being displayed on computer screens from casual observance.
II2.9.4 M Display workstations are configured to automatically log-off when inactive for a predetermined length of time.

II2.9.5 M Display workstations are placed with consideration for optimal ergonomics.

II 2.10 Archives and retrieval ensures timely access to current and historical data.

Intent: Quality patient care may depend on timely availability of the image interpretation.

II2.10.1 M Prior examinations are retrievable in a timely manner and available for comparison at the time of interpretation.

Intent: Prior examinations are retrievable from archives in a time frame appropriate to the clinical needs of the facility and staff.

II2.10.2 M Each exam data file has an accurate corresponding patient and examination database record.

This database record includes:

II2.10.3 M patient name.

II2.10.4 M identification number.

II2.10.5 M accession number.

II2.10.6 M examination date.

II2.10.7 M facility at which the examination was performed.

II2.10.8 M Digital data is retrievable “on-line” for a designated period of time, depending on the needs of the facility.

II2.10.9 M “On-line” storage capacity planning is periodically performed to ensure the storage needs of the facility are maintained.

II2.10.10 M When reversible and irreversible compression techniques are used that result in no reduction in clinical diagnostic image quality the compression type and ratios are selected and periodically reviewed to ensure appropriate clinical image quality.

Intent: The appropriate compression for improved transmission rates and the reduced archiving/storage requirements may be considered by the facility.

II2.10.11 M When irreversible (lossy) compression techniques are used, a delegated imaging physician is responsible for review to ensure there is no reduction in clinical diagnostic image quality.
II 2.11 Portable media used in the exchange of diagnostic information allows reliable and secure viewing of diagnostic information.

- II2.11.1 When exchanging diagnostic images/reports on portable media, the facility uses media and file systems which are compliant with the IHE portable data for imaging profile (PDI). See also Imaging Informatics Accreditation Standard, II1.4.5.

- II2.11.2 CD’s are appropriately labeled and include user viewing instructions as part of the CD package.

- II2.11.3 CD packaging includes, labels directly printed on the media, external CD package labels, and a statement that the contents are confidential medical records, with instructions on what to do if located.

- II2.11.4 The use of CD’s / DVD’s is discouraged for archive purposes.
  Intent: IHE does not recommend that portable media are used for archive purposes. Imaging services are advised to discuss this with their IT systems vendor, read any product disclaimers and seek independent advice about recommendations for media type suitability and storage advice.

QUALITY ASSURANCE

II 3.0 Quality Assurance programs are established to ensure the attainment of intended quality.

Note: Digital imaging devices and display system performance is monitored at intervals consistent with proper quality control. See Equipment and Supplies, Global Modalities and modality-specific Accreditation Standards for defined QC procedures.

II 3.1 Diagnostic image quality is monitored and maintained.

- II3.1.1 There are documented policies and procedures for monitoring and evaluating the effective management, safety, proper performance of imaging, transmitting, receiving and display equipment.

- II3.1.2 Procedures are systematically monitored and evaluated as part of the overall quality improvement program of the facility.

- II3.1.3 Facilities have access to medical physicists, bioengineers and image communications specialists on-site or as consultants.

- II3.1.4 A test image, such as the SMPTE test pattern is captured, transmitted, archived, retrieved and displayed at least monthly or other mechanisms exist to test the overall operation of the system.
GLOSSARY

AAPM – American Association of Physicists in Medicine.

Acquisition facility – The location of the origin of the images. The acquisition facility is not always the location of direct communication to the reporting facility.

Archive – A repository for digital medical images in a Picture Archiving and Communication System (PACS), typically with a specific purpose of providing either short-term or long-term storage of images.

Bit – (Binary digit) – The smallest piece of digital information that a computing device handles. It represents off or on (0 or 1). All data in computing devices are processed as bits or strings of bits.

Bit depth – (Binary digit) The number of bits used to encode the signal intensity of each pixel of the image. The bit depth determines the number of grayscale levels in the image.

Byte – A grouping of 8 bits used to represent a character of value.

Compression ratio – The ratio of the number of bits in an original image to that in a compressed version of that image. For example, a compression ratio of 2:1 would correspond to a compressed image with one-half the number of bits of the original.

Data communication – All forms of computer information exchange. Data communication may take place between two computers in the same building via a local area network (LAN), across the country via telephone, or around the world via satellite.

Data compression – Methods to reduce the data volume by encoding it in a more efficient manner, thus reducing the image processing and transmission times and storage space required. Methods may be reversible or irreversible.

Digitize – The process by which analog (continuous value) information is converted into digital (discrete value) information.

Direct image capture – The capture or acquisition of digital image data that has been acquired in digital format by an imaging modality. The image produced from the data, regardless of the modality (e.g. CT, MRI, CR, ultrasound, etc.) that produced it, should include the full spatial resolution and bit depth of the original.

Dynamic range – The difference in signal intensity, or frequency, between the largest and smallest signals a system can process or display. Increasing the number of bits per pixel in a digital image increases the dynamic range of the image.

G (giga) – Standards for the number 1 billion. It is used primarily when referring to computer storage capacities; for example, 1 GB = 1 billion bytes or 1,000 megabytes.

Grayscale – The number of different shades of levels of gray that can be stored and displayed by a computer system. For example, 6 bits = 64 gray levels, 8 bits = 256 gray levels, 10 bits = 1,024 gray levels and 12 bits = 4,096 gray levels.
Grayscale monitor – A black-to-white display with varying shades of gray, ranging from several shades to thousands, thus being suitable for use in imaging. This type of monitor may also be referred to as a monochrome display.

Image compression – Reduction of the amount of data required to represent an image. This is accomplished by encoding the spatial and contrast information more efficiently or discarding some non-essential information or both.

Irreversible compression – Some permanent alteration of digital image data. This may be referred to as lossy compression.

K (kilo) – Standards for the number 1 million. It is used primarily when referring to computer storage and memory capacities; for example, 1 MB = 1 million bytes. 1 MB = 1,024 thousand bytes or 1,000 kbytes.

M (mega) – Standards for the number 1,000. It is used primarily when referring to computer storage and memory capacities; for example, 1 kbps = 1,024 bytes.

Megapixel (MP) - One million pixels, this term is often used to describe LCD and CRT monitors based upon the number of pixels that can be individually mapped to the display surface.

Matrix – An image formed by distinct points in both the horizontal and vertical directions. For example, a 512 matrix is made up of 512 points in one axis and 512 points in another.

Matrix size:

- **Small matrix size** – Defined as images from CT, MRI, ultrasound, echocardiography and nuclear medicine.

- **Large matrix size** – Defined as images from computed radiography, digital radiography and digitized radiographic film.

- **Extra large matrix size** – Defined as images from mammography.

Peripheral – A device that is connected to a computer and performs a function. Scanners, mouse pointers, printers, keyboards, and monitors are examples of peripherals.

Pixel (picture element) – A pixel can be described as the smallest element of a digital image. An image is composed of a large array of pixels of differing intensities normally composed of a two-dimensional (square) matrix of pixels.

Protocol – A set of guidelines by which two different computer devices communicate with each other.
Resolution – May be defined as the ability of an imaging system to differentiate between objects. Spatial resolution is the ability to distinguish small objects at high contrast. It is related to and in some cases limited by the pixel size. Contrast resolution is the ability of a system to distinguish between objects of the same size having different signal intensity – It is related to and in some cases limited by the bit depth.

Reversible compression – No alteration of original digital image data upon reconstruction. This may be referred to as lossless compression.

Secondary image capture – The capture in digital format of image data that originally existed in another primary format (e.g. a digital image data file on a CT scanner or a screen-film radiographic film) through the process of video capture or film digitization.

SMPTE – The Society of Motion Picture and Television Engineers.

T (tera) – Standards for approximately 1 trillion ($10^{12}$). It is used primarily when referring to archive storage capabilities; for example, 1 TB = 1 trillion bytes, 1 million MB or 1,000 GB.
REVIEWED DOCUMENTS

The contents of the Canadian Association of Radiologist Standards for Teleradiology and the American College of Radiology-Standard for Digital Image Data Management and American College of Radiology Technical Standard for Teleradiology have been adapted to develop the DAP Imaging Informatics standards.

College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.

ACR Technical Standard For Electronic Practice of Medical Imaging. 2007 (Res.13)*


SPECIFIC DOCUMENTS REFERENCED

1. Assessment of Display Performance For Medical Imaging Systems, AAPM On-line Report No. 03, 2005, p.31. Retrievable from:
   http://www.aapm.org/pubs/reports/OR_03.pdf

2. Assessment of Display Performance For Medical Imaging Systems, AAPM On-line Report No. 03, 2005 Table 3, p. 64 Retrievable from:
   http://www.aapm.org/pubs/reports/OR_03.pdf
ACCREDITATION STANDARDS 2010

EQUIPMENT AND SUPPLIES

The Equipment and Supplies Accreditation Standards are applicable to multi-modalities and are to be used in conjunction with the modality-specific standards.

Introduction:
Equipment used to perform imaging examinations can be divided into categories that include: equipment used in the imaging chain such as the medical imaging devices and film processors, etc.; and ancillary equipment used for specific examinations such as power injectors, biopsy devices, etc. The range and variety of consumable supplies required is directly proportional to the complexity of the examinations performed.

The Equipment and Supplies section of the accreditation standards addresses:
- Equipment operation
- Equipment testing
- Quality assurance programs
- Equipment quality control
- Supplies

Definitions:
Acceptance testing is a process to verify compliance with the performance specifications of the equipment as written in the purchase contract. It also verifies that the equipment performance meets the manufacturer’s specifications and complies with federal and provincial or territorial regulations. Acceptance testing is to be performed prior to any clinical use of the equipment. It is recommended that acceptance testing be performed by, or under the supervision of, a medical physicist, with in-depth knowledge of the particular type of equipment and the relevant regulations. This individual is to be independent of the manufacturer.¹

There is a distinction between acceptance testing and regularly performed Quality Control (QC). Acceptance testing is performed to verify the manufacturer’s claims and to verify compliance with regulatory standards. Acceptance testing also provides baseline levels which can be used for comparison of regular QC tests (for example the output dose levels of x-ray equipment cover a range so there is no “correct” value, but they should stay relatively constant). QC tests are performed at appropriate intervals to determine whether the performance of a device has changed after its installation/acceptance (baseline value).

¹ Enhancing public safety through excellence in diagnostic medicine accreditation
If the measured performance value is within the predetermined acceptance deviation limit (established criteria), the equipment will be continuously used until the next test. If the measured performance value is outside the acceptable range, an appropriate remedial action is to be taken.

*Refurbished* is a term used by Health Canada to define medical imaging equipment for the purpose of resale and redistribution (e.g. the equipment ownership has changed). In this context, refurbished refers to modifying of a device (cleaning, repairing, replacing parts, and changing aesthetics) but not significantly changing the device's performance or intended use. If modifications to the device also change the intended use of the device than this would be considered "manufacturing of a new device".

All new, used, and refurbished medical X-ray equipment, and accessories for such equipment, which are sold, imported or distributed in Canada, must conform to the requirements of Health Canada; Radiation Emitting Devices regulations and the Medical Devices regulations. The Radiation Emitting Devices regulations specify standards for information, labeling, construction and performance of equipment, with respect to radiation safety.

The Medical Devices Regulations encompass all other safety considerations and the question of efficacy for all medical equipment sold in Canada. It is the responsibility of the manufacturer or distributor to ensure that the equipment conforms to the requirements of these regulations. Evidence of compliance includes an active Health Canada medical device licensing number.²

**EQUIPMENT**

**DES 1.0** Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

**DES 1.1** There is a current inventory for all equipment used in the imaging chain that includes:

*Intent:* Equipment includes at a minimum the medical imaging devices and the ancillary equipment such as processors, digitizers, printers and digital primary display systems, etc.

- DES1.1.1 [M] name of item.
- DES1.1.2 [M] manufacturer.
- DES1.1.3 [M] serial number or other identifier.
- DES1.1.4 [M] date of installation.
- DES1.1.5 [M] condition of equipment at the time it was acquired (e.g. new, refurbished).
- DES1.1.6 [M] acceptance testing reports.
- DES1.1.7 [M] radiation surveys (for radiology and CT equipment).
- DES1.1.8 [M] mammography medical physicist reports.
- DES1.1.9 [M] quality control records.
- DES1.1.10 [M] preventive maintenance records.
- DES1.1.11 [M] repair records.
Medical imaging devices and ancillary equipment are appropriately operated.

An orientation and training program is provided to those who use the equipment to ensure safe, consistent, and accurate operation.

Specialized equipment and instrumentation is operated by competent staff with the necessary education, knowledge, skills and certification.

Equipment is used only as intended by the manufacturer.

Equipment operators have access to the manufacturer’s operator manual for the specific equipment used in the facility.  

All equipment is located and stored in a safe and secure location.

Equipment is located to maximize efficiency.

All personal protective equipment, (lead aprons, etc.) when not in use, are stored in accordance to the manufacturers’ recommendations.

Power injectors are capable of varying injection volumes and rates and have appropriate safety mechanisms to prevent over injection and to detect the presence of air.

The imaging service investigates and resolves problems involving all equipment.

Roles and responsibilities for reporting, investigating and resolving equipment problems are clearly communicated and understood.

There is a list of service staff and their contact information.

Responsible staff members are trained in resolving equipment problems.

Information about problems is collected, documented, monitored and analyzed.

Actions to prevent recurrence are identified.

Manufacturer-issued defects, recalls and safety advisories are acted upon immediately.

There is a process for resolving non-compliance or quality issues with the vendor in a timely manner.

Equipment problems that impact examination quality and/or safety are reported and repaired.

Any equipment that is not functioning as per manufacturer guidelines and/or poses a safety risk are clearly labeled and removed from service.

Any equipment that exhibit performance limitations, but is deemed safe, is identified to relevant staff.

Equipment is repaired in a suitable location that provides the necessary staff protection.

Equipment testing is performed prior to clinical use.

Note: The modality-specific activities associated with acceptance testing, mammography Medical Physicist reports, and QC procedures can be found in the modality-specific Accreditation Standards.

Acceptance testing is performed after purchase and prior to clinical use of equipment.

New, replaced, or relocated equipment has acceptance testing performed prior to clinical use.

Guidance: Relocated imaging equipment does not refer to imaging devices commonly used for mobile imaging (e.g. ultrasound units, mobile X-ray units, etc.).

The tester is independent of the manufacturer.
DES2.1.3 ☐ Results from the acceptance testing are used to establish baseline values and limits of acceptance on operational performance of the X-ray.\(^5\)

DES2.1.4 M ☐ Acceptance testing reports are submitted to the DAP.

DES 2.2 Repaired or upgraded equipment has the necessary testing performed prior to clinical use.

DES2.2.1 M ☐ Appropriate testing is performed for damaged/repaired equipment or equipment with major software/hardware upgrades prior to clinical use.

Guidance: This may require acceptance testing or specific QC testing to ensure the equipment meets regulatory standards or manufacturer’s specifications.

DES 3.0 Quality Assurance programs are established to ensure the attainment of intended quality.

Intent: A quality assurance program means the planned and organized actions necessary to provide adequate confidence that the equipment and its related components will reliably produce quality images providing the necessary information for accurate clinical assessment. A quality assurance program includes quality control procedures for the monitoring and testing of medical imaging equipment and related components, and administrative methodologies to ensure that monitoring, evaluation and corrective actions are properly performed. Quality Control procedures are an essential component of a quality assurance program which clearly specify the technical procedures necessary for the monitoring and testing of the imaging equipment and related components.

Listed below are the essential components for implementing an effective Quality Control monitoring program.

- Quality Control records: It is essential that measurements and information gathered be clearly documented and readily available for evaluation.
- Evaluation of Data: Recorded data is to be evaluated immediately and necessary action taken expeditiously.
- Baseline Performance Levels: Baselines values are to be determined when new equipment is introduced into the facility, when there are changes in components which effect image quality and patient dose and also when testing equipment is changed. Baselines values are to be established after verifying that equipment functions properly.
- Testing Frequency: The frequency of testing is increased if the equipment exhibits significant changes between scheduled Quality Control tests, or if the equipment is used for an exceptionally high volume of procedures. Additional testing is performed if the results of testing fall outside the limits of acceptability for the tests, or after any corrective actions are made. The quality control program is not to be discontinued if the results indicate relatively stable equipment performance.
Corrective Actions: There are established repair and calibration procedures to deal with significant problems. A decision tree system is to be developed to provide guidance to deal with events such as equipment failure and to deal with circumstances when equipment performance deviates beyond the set limits. A list of individuals having the authority to stop operation of equipment is to be established. The decision tree includes the following steps:

- repeat test to confirm;
- what to do if repeated test confirms performance failure;
- what to do if test fails only marginally;
- what to do if test shows a history of failure; and
- what to do if test fails substantially.

DES 3.1 Quality Control procedures are performed by staff knowledgeable in the testing procedures.

Guidance: QC test procedures and frequency of testing are defined in the modality-specific Accreditation Standards.

DES3.1.1 M There is a designated person(s) responsible for monitoring and reviewing QC on a regular basis.

Intent: The facility determines who is trained and knowledgeable to perform and monitor QC procedures. Some QC procedures may be designated to individuals. For example, technologists may perform some frequently scheduled QC procedures, QC coordinators, equipment service providers, consultants, and biomedical service engineers may perform more specialized procedures and Medical Physicists may perform or provide consultation for all or some of the QC procedures.

DES3.1.2 M Staff have the necessary training, reference and education materials available to ensure QC is performed according to manufacturer’s recommendations or recognized best practices.

DES 3.2 Quality Control testing equipment is maintained and monitored.

DES3.2.1 M All equipment used for acceptance and quality control testing is evaluated for their functionality and performance on a regular basis according to manufacturer’s recommendations.

Guidance: All sensitometric and densitometric equipment, dose meters, and tube voltage meters are calibrated on a regular basis according to manufacturers’ recommendations. All phantoms and other equipment used for the assessment of image quality, dose and system performance are to be checked for damage or any condition which may affect their use.

DES3.2.2 M Testing equipment is operated following manufacturer’s recommendations.

DES3.2.3 M Test equipment is stored away from heat, direct sunlight, and high humidity.
ACCREDITATION STANDARDS
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DES  3.3  Out of range or unacceptable QC values are promptly reviewed and investigated. When QC problems are identified; procedures are implemented to determine cause(s).

DES3.3.1 M Corrective action is taken and monitored.

DES3.3.2 M QC problems, investigations and corrective actions are documented and retained.

DES  3.4  There is a preventive maintenance program.
Intent: An inspection is conducted for structural integrity, cleanliness, ease of movement of all components and any other procedures recommended by the manufacturer.

DES3.4.1 M Documented preventive maintenance is performed at regular intervals by appropriately trained staff according to manufacturer’s recommendations.

DES3.4.2 M All immobilizing devices are inspected for safety and cleanliness.

DES3.4.3 Maintenance personnel ensure that the record of all repair and maintenance procedures are properly recorded and communicated to relevant staff.

DES3.4.4 Maintenance personnel review the maintenance procedures periodically and update them to ensure optimum patient and operator safety.
Common Equipment QC

**Definition**:

There are two classes of display systems: *primary* and *secondary systems*

*Primary display systems* are those used for the interpretation of medical images. In prior literature, primary display systems have sometimes been referred to as “diagnostic” monitors.

*Secondary display systems* are those used for viewing medical images for purposes other than for providing a medical interpretation. In this class of displays, there are also operator’s console monitors and quality control (QC) workstations, display devices that are commonly used to “adjust” the images before they are sent to PACS or hard-copy printers. As the performance of these systems (especially their luminance response) directly impacts image presentation at other display devices, their performance needs to maintain a minimum level of acceptability. Ideally, they comply with the luminance response requirements of primary displays. In other aspects, they may be treated as secondary class displays. In prior literature, secondary display systems have sometimes been referred to as “clinical” monitors.

Two photometric quantities are of great importance in discussion of display performance or specifications: *luminance* and *illuminance*.

*Luminance* is the term used to describe the rate at which visible light is emitted from a surface—display surface in the case of displays. It refers to the energy of visible light emitted per second from a unit area on the surface into a unit solid angle (Ryer 1998, Keller 1997). The energy of visible light reflects the visibility of light quanta as a function of wavelength through a standard photometric weighting function. The SI unit for the energy of visible light is the lumen-second, and therefore, the unit for luminance is 1 lumen per steradian per meter squared, commonly referred to as *candela per meter squared* (cd/m$^2$). The unit cd/m$^2$ is sometimes referred to as nit.

*Illuminance* is the term used to describe the rate at which visible light strikes a surface. It is often used to describe the amount of ambient lighting or the light striking a display surface. The unit of illuminance is lumen per meter squared (lm/m$^2$), or *lux* (lx), a unit identical to luminance except for the absence of the solid-angle dimension.

**DES  3.5**

Quality Control procedures are established and used to monitor performance of electronic display devices (display monitors/systems). Note: The activities associated with mammography display devices are identified in the Mammography Accreditation Standards.

**Guidance:** Before testing a display device, the cleanliness of the faceplate should be verified. If the faceplate is not clean, it is to be cleaned following the manufacturer’s recommendations. The artifacts and loss of image quality associated with reflections from the display surface depend on the level of ambient lighting. It is important to verify that the ambient lighting in the room is below the maximum recommended threshold for ambient light level. The conditions for the test procedures are to be similar to those under normal use of the equipment.
ACCREDITATION STANDARDS
EQUIPMENT AND SUPPLIES

DES3.5.1  M  The performance of new electronic display devices used for the interpretation of diagnostic images and guidance during interventional procedures is tested to verify performance prior to clinical use.  
Guidance: Performance of new display systems is tested to verify performance according to DICOM standard and recalibrated if necessary.

DES3.5.2  M  Daily, an overall visual assessment of electronic display devices (e.g. the primary display systems/monitors) used for interpretation of diagnostic images. 
Guidance: QC test patterns are used to visualize the line patterns in each corner and visibility of the 5% and 95% squares in the center of the pattern. The daily QC of a display system is to be performed by the operator/user of the system. Interpreting physicians using electronic displays are to be familiar with the daily testing procedure and expected results.

DES3.5.3  M  Monthly, an overall visual assessment of all electronic display devices (e.g. primary systems used for interpretation purposes and secondary systems used for consultation/review) used to view images from digital systems, as well as those obtained through scanning of radiographic films. 
Guidance: QC test patterns are used to visualize the line patterns in each corner and visibility of the 5% and 95% squares in the center of the pattern. 
Note: For “closed systems”, where a suitable test pattern is not available on the system, a test pattern generator equipped with the appropriate test patterns is utilized. Where a system does not have the capability to display an externally provided pattern, the manufacturer’s recommended quality control procedures are to be followed. Examples of “closed systems” may include those in fluoroscopic examination suites, digital angiography, or digital subtraction angiography, and secondary displays, including operator console monitors.

DES3.5.4  M  The performance of electronic display devices used for the interpretation of diagnostic images and guidance during interventional procedures is at a minimum tested annually to verify performance. 
Guidance: Display systems are tested to verify performance according to DICOM standard and recalibrated if necessary.

DES  3.6  M  The quality control procedures for primary display systems at non-hospital (e.g. clinic or home reporting) settings meet the requirements as listed in Equipment and Supplies Accreditation Standards, DES 3.5.  See also Imaging Informatics Accreditation Standards, II 1.4.4, II 2.3, II2.4, II2.5, II2.6, and II2.7 for primary display specifications and reporting room environment requirements at non-hospital settings.
Quality Control procedures are established and used to monitor performance of viewboxes.\(^\text{12}\)

*Guidance:* Ensure all viewboxes have been turned on for a minimum of 30 minutes before obtaining measurements.

- **DES3.7.1**  
  M Weekly, viewboxes are inspected visually for cleanliness, viewing area discoloration and improper illumination.

- **DES3.7.2**  
  M Annually, all viewboxes are tested for compliance.

Annual testing of the following requirements:

- **DES3.7.3**  
  M Luminance is at least 2,500 nits (cd/m\(^2\)) for X-ray images.

- **DES3.7.4**  
  M Luminance is at least 3,500 nits (cd/m\(^2\)) for mammography images.

Annual testing of:

- **DES3.7.5**  
  M Light output uniformity.

- **DES3.7.6**  
  M Light output homogeneity.  
  *Guidance:* The light output homogeneity between a bank of viewboxes is uniform to within 15%-20% of the mean.

- **DES3.7.7**  
  M Ambient light control.  
  *Guidance:* The ambient light within the reading room is less than 50 lux.

Quality Control procedures are established and used to monitor performance of laser printers.\(^\text{12}\)

*Guidance:* Ensure that the viewbox used to assess printed films has sufficient luminance. See also Equipment and Supplies Accreditation Standards, DES 3.7.3 and 3.7.4.

- **DES3.8.1**  
  M Weekly, laser film printer operation is evaluated.  
  *Guidance:* Test patterns are printed. A hardcopy image of the test pattern meets the following criteria; the 5% patch is just visible inside of the 0% patch, the 95% patch is just visible inside the 100% patch, no geometrical distortion upon visual inspection, and no artifacts upon visual inspection.

- **DES3.8.2**  
  M Monthly, laser film printer operation is evaluated.  
  *Guidance:* A hardcopy image of the test pattern that meets the same criteria as weekly testing (see DE3.8.1), with the additional evaluation of the optical density of various patches (e.g. 0%, 20%, 40%, 60%, 80% and 100%) are within acceptable limits from the established baseline values, for the particular film used at the facility.

Quality Control procedures are established and used to monitor performance of laser scanning digitizers.\(^\text{12}\)

- **DES3.9.1**  
  M Weekly, laser scanning digitizers are checked for cleanliness.
Quality Control procedures are established and used to monitor performance of personal protective equipment. See also Radiation Safety Accreditation Standard, RS4.3 for attenuation equivalents, equipment and storage requirements, etc.

Personal protective equipment (e.g. lead aprons, etc.) are inspected and tested for defects a minimum of once per year.

Guidance: All personal protective equipment is examined using radiographic or radioscopic equipment to ensure they are not defective. Any defective equipment is removed from clinical use. Personal judgment is to be used when small defects are located along the edges of the protective equipment and when defects are due to stitching of the equipment.

Lead aprons where the total defective area is greater than 670 mm² are removed from clinical use.

Personnel protective equipment having a defect in the vicinity of the thyroid or the reproductive organs which is larger than the equivalent of a 5 mm diameter circle is removed from clinical use.

Solutions and supplies are monitored in a way that reduces or eliminates shortages and waste.

The storage and monitoring of solutions and supplies ensures an effective inventory control system.

Storage complies with manufacturer’s recommendations.

Receipt and service entry dates are recorded as necessary.

Expiration dates are monitored.

Rejected/expired goods are clearly marked and dealt with appropriately.

Inventory control problems and actions taken are documented.

There is a process for resolving non-compliance or quality issues with the vendor in a timely manner.

Documentation of supply utilization is routinely reviewed.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.


SPECIFIC DOCUMENTS REFERENCED

1 Health Canada Safety Code 35. Radiation Protection in Radiology—Large Facilities. Safety Procedures for the Installation, Use and Control of X-ray Equipment in Large Medical Radiological Facilities, Section B, 2.2.4, p.23


5 Health Canada Safety Code 35. Radiation Protection in Radiology—Large Facilities. Safety Procedures for the Installation, Use and Control of X-ray Equipment in Large Medical Radiological Facilities, Section B, 2.2.4, p.23


GLOBAL MODALITY

The Global Modality Accreditation Standards are applicable to multi-modalities and are to be used in conjunction with the modality-specific Accreditation Standards.

Introduction:
The Global Modality Accreditation Standards examine those practices related to pre-examination, examination, and post-examination processes in the performance of diagnostic imaging.

The Global Modality section of the accreditation standards addresses:
- Examination requests
- Patient preparation
- Imaging procedures
  - Protocols (procedures/positioning manuals)
  - Intravascular contrast agents
  - Sedation and anesthesia
  - Medical record
    - Images
    - Clinical information recorded for interpretation purposes
    - Interpretation and reports

EXAMINATION REQUEST

Definitions:

Authorized individual is a term used to describe a physician or other designated health professional defined under relevant legislation as having the ability to request diagnostic imaging examinations.

Imaging physician refers to a physician who is approved by the College of Physicians and Surgeons of BC to perform diagnostic services in their area of specialty and approved to perform restricted services, as applicable.

Enhancing public safety through excellence in diagnostic medicine accreditation
GM 1.0 Examination requests are standardized and ensure that accurate, comprehensive and appropriate information is relayed.

Guidance: Requests for imaging referrals are to be completed for all imaging examinations. Requests may be verbal, written (requisitions) or electronic.

GM 1.1 Processing of the examination requests ensures:

GM1.1.1 Examinations are only performed when requested by authorized individuals.

Guidance: There is a facility policy that defines “authorized individual” that includes medical physicians and other designated health professionals as permitted by governing legislation, rules and bylaws.

GM1.1.2 Verbal requests are immediately followed with an authorized electronic or written request.

GM1.1.4 Requests that lack the necessary information or contain errors are reconciled prior to the examination.

GM1.1.5 Authorized individuals requesting examinations are notified when examinations are cancelled by the imaging service.

GM 1.2 Examination requests include accurate information that is received prior to an examination being undertaken.

Information recorded on the requisition includes:

GM1.2.1 The patient’s first and last name.

GM1.2.2 A unique personal identifier number such as Provincial Health Number (PHN) or facility-issued identifier number.

GM1.2.3 Date of birth.

GM1.2.4 Gender.

GM1.2.5 Name and contact information of authorized individual.

Intent: If an urgent/stat report is required the authorized individual’s contact information is provided.

GM1.2.6 Clear indication of the authorized individual.

GM1.2.7 Names of any other individual who is to receive a copy of the report.

GM1.2.8 Examination type(s) and any specific instructions.

GM1.2.9 Pertinent clinical information including indications, history, and provisional diagnosis.

Intent: The clinical information is sufficient to ensure the appropriate examination is performed. Provisional diagnosis is provided when applicable to assist in determining the most appropriate imaging examination.

GM1.2.10 The date the request is received.

GM1.2.11 Indication of urgency.

Intent: There is an effective system in place to ensure patient prioritization. For emergent patient prioritization cases the urgency is indicated on the request either by the authorized individual and/or by the imaging physician or delegate.
PATIENT PREPARATION

GM 2.0 Patients are appropriately prepared for the examination being performed.

GM 2.1 Patient preparation instructions are clearly communicated.

GM2.1.1 M Patients and/or supporting individuals are advised of patient instructions prior to the examination, as needed.
GM2.1.2 Patient instructions are available in a variety of languages considering the population served.
GM2.1.3 There are processes to identify and work with patients who do not speak English.
GM2.1.4 Multi-lingual staff are identified and available where practical and in accordance with the imaging service policy.

GM 2.2 Pre-examination information is collected and assessed prior to commencing the examination.

GM2.2.1 M There are processes in place to ensure that patients have followed the preparation instructions and to address situations where patients are inappropriately prepared.
GM2.2.2 Any factors that may affect the examination are documented and considered.
GM2.2.3 M Processes ensure relevant prior examinations are available for comparison.
   Guidance: The criteria to obtain relevant prior examinations are clearly defined by the medical leader to ensure processes are followed. In some instances relevant prior examinations will need to be requested from external organizations.
GM2.2.4 M There are procedures in place to deal with images received from external facilities that are not appropriately identified or where there is a discrepancy in the clinical information.
GM2.2.5 M Prior to having any invasive procedures, the patient or patient’s guardian is informed of the indications, risks, alternatives and nature of the examination in accordance with service policy and provincial legislation.
   Guidance: See also Patient and Client Focus Accreditation Standards, DPC 3.4.
GM2.2.6 M When required, informed consent is documented in accordance with hospital or service policy and provincial legislation.
   Guidance: See also Patient and Client Focus Accreditation Standards, DPC 3.4.

IMAGING PROCEDURES

GM 3.0 Standard protocols result in images appropriate for their intended use in clinical decision-making.

GM 3.1 There is a comprehensive process in place for protocol adoption and development.

GM3.1.1 Protocols selected for use have been developed by experts in the appropriate fields, cited and published in peer-reviewed textbooks, journals and/or websites and/or have been recommended by national, international or regional agencies.
GM3.1.2 M Before new protocols or those not recognized as standard practice are used; they are validated by the medical leader to confirm that they satisfy intended use.
GM3.1.3 Validation results for new protocols are retained.
INTRAVASCULAR CONTRAST AGENTS

GM 4.0 Intravascular contrast agents are managed and administered safely and effectively.

GM 4.1 Emergency equipment and supplies are available for a response to a medical emergency.

*Intent:* By having the emergency equipment on hand, and available, the expectation is that staff are properly trained in the use of each of these items. Additionally, the necessary equipment sizes are to be available on-site to treat their patient population (e.g. pediatric versus adult patient population).

GM4.1.1 M When IV contrast is administered there is either an emergency crash cart or a modified emergency cart immediately accessible. In this context “immediately accessible” refers to the cart reaching the patient within thirty (30) seconds.

GM4.1.2 M If there is no emergency crash cart, a modified emergency cart is available.

The modified crash cart contains, at a minimum, the following:

**Airway**
- GM4.1.3 M pocket mask
- GM4.1.4 M oral airway set
- GM4.1.5 M suction equipment with tubing and catheter
- GM4.1.6 M tongue depressor

**Breathing**
- GM4.1.7 M O2 face mask (non-rebreather)
- GM4.1.8 M bag-valve-mask device
- GM4.1.9 M oxygen tank (“D” Cylinder) with flow valve and tubing
- GM4.1.10 M pulse oximeter

**Circulation**
- GM4.1.11 M cardiac defibrillator
- GM4.1.12 M stethoscope
- GM4.1.13 M blood pressure cuff
- GM4.1.14 M intravenous supplies
- GM4.1.15 M tourniquet, 4 X 4 gauze and tape
- GM4.1.16 M IV catheters (18 gauge or larger)
- GM4.1.17 M IV pole and tubing
- GM4.1.18 M normal saline (2 X 500 cc bags)

**Other**
- GM4.1.19 M flashlight
- GM4.1.20 M an emergency drug tray is available in the room.

The emergency drug tray includes the following:

- GM4.1.21 M nitroglycerine, in tablet or aerosol spray
- GM4.1.22 M epinephrine
- GM4.1.23 M atropine
GM 4.2 Policies and procedures are in place for the administration of intravenous contrast agents.

Guidance: See also Patient Safety Accreditation Standard DPS 4.0.

GM4.2.1 Policies and procedures are in place for technologists who perform venipuncture and administer intravenous contrast.

Guidance: See also Medical Staff Accreditation Standard DMS 4.0 regarding delegation of medical acts.

GM4.2.2 Contraindications are assessed (e.g. patients with renal disease, previous contrast reaction, relevant allergies, breast feeding, etc.).

GM4.2.3 Unaltered gloves are worn during venipuncture.

GM4.2.4 There are dose protocols for adults and pediatrics.

GM4.2.5 Staff is trained in the management of reactions and extravasations.

GM4.2.6 Documented procedures are in place for treating patients with adverse contrast events.

Guidance: After a reaction there is documentation of the effect and treatment, reporting to the appropriate healthcare personnel, counseling about future contrast administration, and flagging of the patient’s medical record.

GM4.2.7 There is consultation with a radiologist or designated physician prior to injection through a central line with a power injector.

GM4.2.8 There is a procedure for handling multi-dose contrast agent vials.

GM4.2.9 Storage of contrast agents complies with manufacturer’s recommendations.

GM 4.3 There is physician supervision for all examinations that involve intravenous contrast agent administration.

GM4.3.1 The radiologist or a designated physician is responsible for direct supervision.

Guidance: Direct supervision means that the physician is present and immediately available to provide assistance and direction throughout the performance of the procedures. It does not mean that the physician is to be present in the room where the procedure is performed. Training and proficiency in cardiopulmonary resuscitation are recommended for those who attend to patients undergoing contrast-enhanced examinations.

GM4.3.2 The supervising physician is immediately available by phone, and can respond promptly to an adverse event.

GM4.3.3 The supervising physician is able to attend the patient within three minutes.

GM4.3.4 The supervising physician is aware of the specific relative contraindications and pertinent risk factors that might increase the likelihood of adverse events from contrast administration.
GM4.3.5 M The supervising physician is knowledgeable in the recognition and treatment of adverse events (e.g. idiosyncratic reactions, extravasations).

GM 4.4 Policies and procedures are in place for screening and prevention of Contrast Induced Nephropathy (CIN).\(^1\)

Intent: Common contrast enhanced scans include Computed Tomography, angiography, venography or intravenous pyelograms. The development of acute renal failure is a significant complication of intravascular contrast medium (CM) use and is linked with excess morbidity and mortality. The increasing use of CM, an ageing population and an increase in chronic kidney disease (CKD) will result in an increased incidence of contrast induced nephropathy (CIN) unless preventative measures are used. The major risk factor predicting CIN is pre-existing CKD, which can be predicted from estimated glomerular filtration rate (eGFR).

GM4.4.1 M All patients being scheduled for contrast enhanced examinations are screened for significant renal disease or risk factors.

GM4.4.2 M There is an established acceptance criteria for the date of most recent eGFR for both in-patients, and outpatients.

Guidance: As a minimum requirement it is recommended that SCr (and GFR) be obtained within 3 months of the contrast procedure in the stable out-patient with one or more of the listed risk factors, and within 1 week for all in-patients. In patients with unstable or evolving disease, a more recent SCr (and GFR) should be obtained. In some facilities it may be considered safer and more practical to obtain SCr systematically in all patients referred for iodinated CM injection.

GM4.4.3 M eGFR is obtained for all adult patients (and children if indicated by renal history).

Guidance: The baseline renal function of patients undergoing contrast studies is best assessed with calculations of GFR (eGFR). Serum creatinine is not a reliable indicator of renal function in many patients. Using calculated GFR to assign risk levels and implement prevention strategies is considered to be the best approach to reduce the incidence of CIN.

GM4.4.4 M Prevention strategies for high-risk patients are decided on a case-by-case basis by the supervising radiologist.

Guidance: Examples include, but are not limited to; the decision to administer contrast, hydration, assessment of nephrotoxic medications, procedures to follow post administration, etc.

GM4.4.5 M Prior to the examination the patient is fully assessed and precautions are taken in patients with renal impairment.
GM 4.5  Policies and procedures are in place for the use of gadolinium contrast agents in patients with renal impairment.\(^2\)

**Intent:** In 2006, exposure to Gadolinium Based Contrast Agents (GBCAs) was implicated in the pathogenesis of Nephrogenic Systemic Fibrosis (NSF). This has lead to concern regarding the possible relationship between the use of gadolinium contrast agents in patients with generally severe renal impairment, and the subsequent development of nephrogenic systemic fibrosis (NSF).

**GM4.5.1**
- All patients being scheduled for contrast enhanced MRI are screened for contraindications.

**GM4.5.2**
- Renal function testing is scheduled based on an assessment of the screening.

**GM4.5.3**
- There is an established acceptance criteria for the date of most recent eGFR for both in-patients, and outpatients.
  
  **Guidance:** If the screening reveals risk factors for Chronic Kidney Disease, the eGFR should be calculated. Patients whose renal function is known are exempt from such screening. An eGFR obtained within 3 months for outpatients, as long as no interval hospitalization has occurred, or within 48 hours for inpatients is acceptable.

**GM4.5.4**
- eGFR results are available for any patients scheduled for contrast enhanced MRI angiography and/or double-dose examinations (e.g. higher doses than recommended by the manufacturer, ‘off-label’ use).

**GM4.5.5**
- Prevention strategies for high-risk patients are decided on a case-by-case basis by the supervising radiologist.
  
  **Guidance:** Consideration for alternate imaging methods, using a lower dose to achieve a diagnostic examination, use of one of the more tightly chelated contrast agents, and strategies to address patient’s on dialysis, etc.

### SEDATION AND ANESTHESIA

GM 5.0  Appropriate patient monitoring is provided for procedures involving moderate sedation or general anesthesia.

**Definition:**

The term *moderate sedation* (formerly conscious sedation or sedation/analgesia) refers to a drug-induced depression of consciousness during which patients respond purposefully to verbal commands (e.g. “open your eyes,” either alone or accompanied by light tactile stimulation, such as a light tap on the shoulder or face, not a sternal rub). With moderate sedation, no intervention is required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained. If the patient is not making spontaneous efforts to open their airway to relieve the obstruction, then the patient should be considered to be deeply sedated.\(^3\)

GM 5.1  Policies and procedures are in place for the use of moderate sedation and general anesthesia.

**GM5.1.1**
- There are policies and procedures for administering sedation.

**GM5.1.2**
- There are policies and procedures for monitoring patients who have been sedated.

**GM5.1.3**
- There are procedures for discharging patients who have been sedated.
GM 5.2 Patients are appropriately monitored during and after the examination when either moderate sedation or general anesthesia are administered.

GM5.2.1 M Monitoring equipment, resuscitation equipment and associated procedures are appropriate for the patient population (e.g. adults and pediatrics).
GM5.2.2 M Procedures are in place for arranging sedation.
GM5.2.3 M Patients are monitored by qualified individuals (e.g. anesthetist, nurse, etc.) immediately before, during and after the examination.
GM5.2.4 M Emergency drugs and supplies are readily available.
GM5.2.5 M Suction equipment is readily available with appropriate attachments.
GM5.2.6 M Oxygen is available with appropriate delivery devices.
GM5.2.7 M Patients have a functioning intravenous access in place.
GM5.2.8 M Instrumentation to monitor the stability of the patient immediately before, during and after the examination is available.

Instrumentation to monitor the stability of the patient immediately before, during and after the examination includes:

GM5.2.9 M oxygen saturation.
GM5.2.10 M blood pressure.
GM5.2.11 M cardiac monitoring.

Guidance: End-Tidal CO2 during monitored anesthesia care (MAC) may be used, as determined by the anesthesiologist.

GM5.2.12 M The patient’s vital signs and medical stability are periodically evaluated and recorded by qualified staff.
GM5.2.13 M A list of peri-procedural complications is recorded.
GM5.2.14 M There is a procedure for reporting and retaining the records of adverse drug events.
GM5.2.15 M Records of drug administration errors are maintained.
GM5.2.16 M Processes are in place to treat patients who are slow to recover or who are experiencing complications as a result of the procedure:
GM5.2.17 M There is an appropriate physical location and setting to allow patients to recover.
GM5.2.18 M The recovery area is large enough to accommodate the necessary monitoring equipment for emergency management.
GM5.2.19 M There is a policy and procedures for when designated drivers are required for patients who have received sedation.
GM5.2.20 M Prior to discharge from the imaging service, the patient is monitored for a sufficient amount of time and readiness for discharge is documented in the medical record.
GM 6.0 Patients who have received sedation or general anesthesia are appropriately discharged.

GM 6.1 Post-procedure instructions are communicated to patients and supporting individual(s).
*Intent: Procedures are in place that ensures patients who have been sedated or placed under anesthetic are discharged in the care of a responsible adult after appropriate recovery.*

GM6.1.1 M Drugs dispensed to patients at the time of discharge are recorded in the patient record, verbal and written instructions for their use are given to the patient or his/her accompanying adult.

GM6.1.2 M Outpatients are advised of potential complications that may arise post-examination.

GM6.1.3 M Outpatients are given instructions to contact the family physician, imaging service or emergency department in the event that complications arise after the patient is discharged.

**MEDICAL RECORD**

GM 7.0 The medical record is current, accurate and contains quality diagnostic images and relevant examination details.

GM 7.1 Images/examinations are labeled in a standardized way that allows for proper patient identification and annotation that includes:

GM7.1.1 M patient first and last name.

GM7.1.2 M second patient identifier (e.g. identifying number and/or date of birth).

GM7.1.3 M facility name.

GM7.1.4 M date and time of examination.

*Guidance: Time of examination is displayed for digital image acquisitions. The time of examination is included on any film-based images, if relevant (e.g. patients likely to have more than one of a given examination per day).*

GM7.1.5 M identifying annotation (e.g. appropriate image location and orientation).

GM7.1.6 M other imaging parameters as per imaging service policy.

GM 7.2 Comprehensive examination details are recorded in the medical record that includes:
*Intent: Examination details may be recorded electronically or on written requisitions/worksheets. All details are made available to the interpreting imaging physician.*

GM7.2.1 M the patient requisition in paper or electronic format.

GM7.2.2 M technologist performing examination.

GM7.2.3 M date and time of examination.

GM7.2.4 M any contrast or medication-induced adverse events and actions taken to resolve reaction.
GM7.2.5 M □ number of images.
   Guidance: Optimally this is performed by the individual acquiring the images. All images captured, whether on film or on digital imaging systems, remain with the patient study unless they are rejected by the operator for valid predefined quality issues.

GM7.2.6 M □ relevant medication information (e.g. substance, route, identity of person administering, etc.).

GM7.2.7 M □ contrast agent type, dose and time of administration.

GM7.2.8 M □ name of individual who administered contrast agent.

GM7.2.9 □ name of the imaging physician or designated physician responsible for contrast authorization and/or supervision.

GM7.2.10 M □ deviations from the standard protocol are recorded particularly when there are reasons for examination limitations.

GM7.2.11 □ relevant clinical information provided by the patient or observed complications pertinent for interpretation purposes.

GM 7.3 Verification processes are in place to ensure that the intended images are available for interpretation.

GM7.3.1 M □ Prior to interpretation, all digitally acquired images are verified for number of images, markers, orientation, etc. in PACS.
   Guidance: Optimally this is performed by the individual acquiring the images.
INTERPRETATION AND REPORTS

GM 8.0  Diagnostic reports are in a standardized format that provides comprehensive and necessary information for clinical decision-making.

GM 8.1  Reports are comprehensive and include appropriate patient and relevant clinical information.

Reports include the following information:

- GM8.1.1 M the patient’s first and last name.
- GM8.1.2 M a unique personal identifier number such as PHN or facility-issued identifier number.
- GM8.1.3 M date of birth.
- GM8.1.4 M gender.
- GM8.1.5 M facility name.
- GM8.1.6 M examination performed.
- GM8.1.7 M name of authorized individual requesting examination.
- GM8.1.8 M report recipient(s).
- GM8.1.9 M date of the examination.
- GM8.1.10 M time of examination, if relevant (e.g. patients likely to have more than one of a given examination per day).
- GM8.1.11 M date of interpretation (e.g. dictation and/or transcription).

Intent: Having both dates may be useful to some facilities when determining report turnaround times. This information may be available in the RIS.

GM8.1.12 M Multiple page reports include patient identifiers on each sequentially numbered page.

GM 8.2  Reports contain sufficient information to assist in diagnosis.

Introduction: When required, previous images and reports are promptly available for review and comparison with the current examination. A request for imaging includes relevant clinical information, a working diagnosis, and/or pertinent clinical signs and symptoms and may include specific clinical questions to be answered in the final report. Such information helps tailor the most appropriate imaging examination to the clinical scenario, enhances the clinical relevance of the report, and thus promotes optimal patient care.

- GM8.2.1 M Standardized report templates are used.
- GM8.2.2 M Breast imaging final assessment categories such as BI-RADS (e.g. negative, benign, probably benign, suspicious, and highly suggestive of malignancy) are used for reporting findings.

Intent: The use of final assessment categories are designed to standardize breast imaging reporting and facilitate outcome monitoring. Final assessment categories used for reporting findings will become a mandatory requirement in the next version of DAP Accreditation Standards.
The body of the report includes the following:

GM8.2.3  M □ procedures performed and materials.

  Guidance: The report includes a description of the studies and/or procedures performed and any contrast media (including concentration, volume, and route of administration when applicable), medications, catheters, or devices used, relevant patient preparation and positioning details, and relevant post-recovery discharge details. Any known significant patient reaction or complication is recorded.

GM8.2.4  M □ findings.

  Guidance: The report uses appropriate anatomic, pathologic, and imaging terminology to describe the findings.

GM8.2.5  M □ potential limitations.

  Guidance: The report, when appropriate, identifies factors that may compromise the sensitivity and specificity of the examination.

GM8.2.6  M □ clinical issues.

  Guidance: The report addresses or answers any specific clinical questions. If there are factors that prevent answering of the clinical question, this is stated explicitly.

GM8.2.7  M □ comparison with examinations and reports is included in reports when relevant.

  Guidance: Comparison with relevant examinations and reports are part of the consultation and report when appropriate and available.

GM8.2.8  M □ the impression (e.g. conclusion or diagnosis) section of the report.

  Guidance: Unless the report is brief, each report contains an "impression" section. A precise diagnosis is given when possible; a differential diagnosis is rendered when appropriate. Follow-up or additional diagnostic examinations to clarify or confirm the impression is suggested when appropriate. Any significant patient reaction is reported.

GM  8.3  A timely and accurate final report is issued for all examinations.

  Intent: A final report is the definitive means of communicating to the authorized individual or other relevant healthcare provider the results of an imaging examination or procedure. Additional methods for communication of results are encouraged in certain situations.

GM8.3.1  M □ Final reports are issued for all examinations.

GM8.3.2  □ The final report is verified by the reporting physician to minimize typographical errors, accidentally deleted words, and confusing or conflicting statements.

GM8.3.3  M □ Verified reports are signed by the reporting physician.

GM8.3.4  M □ If the content of the report is not verified by the author, it is clearly indicated on the report.

GM8.3.5  M □ If the content of the report has not been verified by the author, there is a process in place to verify the accuracy of the transcription.

GM8.3.6  M □ A copy of the final report is archived by the imaging service as part of the patient’s medical record (paper or electronic) and is retrievable for future reference.

GM8.3.7  M □ Medical staff responsible for the patient is notified of report delays in variance with established turn-around-times and in cases that may compromise patient care.

GM8.3.8  □ The use of abbreviations or acronyms is limited to avoid ambiguity.
Effective communication minimizes the risks of both reporting and patient management errors.

**Intent:** An effective method of communication is tailored to satisfy the need for timeliness, support the role of an imaging physician as a physician consultant by encouraging physician to physician communication and minimize the risk of communication errors. Communication of information is only as effective as the system that conveys the information. There is a reciprocal duty of information exchange. The authorized individual or relevant healthcare provider shares in the responsibility for obtaining results of imaging examinations he or she has requested.

Preliminary reports provide limited information often necessary for clinical decision-making.

**Intent:** Preliminary reports may be communicated in writing, electronically, or verbally, and communication is documented. A preliminary report precedes the final report and contains limited information. Preliminary reports may be time sensitive, and are not expected to contain all the reportable findings. A preliminary report may not have the benefit of prior imaging studies and/or reports and may be based upon incomplete information due to evolving clinical circumstances. Nevertheless, clinical decision making may be based on this report due to the need for immediate patient management. The situations that may require preliminary reports may include, but are not limited to, interpretations provided to emergency and surgical departments and critical care units, or initial readings provided by trainees.

- **GM9.1.1** Preliminary reports are clearly identified as such, distinct from the final report.
  - **Guidance:** Preliminary reports may be in audio, written or electronic format.
- **GM9.1.2** All preliminary reports (communicated in any format) are followed by a final report.
- **GM9.1.3** As soon as possible a change between the preliminary and final interpretation is reported in a manner that reliably ensures receipt by the referring or treating physicians, when such changes may impact patient care.
- **GM9.1.4** Medical staff responsible for the patient is notified when there is a significant discrepancy between a preliminary and the final written report.
- **GM9.1.5** Documentation of communication of any discrepancy between a preliminary and final report is incorporated into the final report.
Urgent and other non-routine examination findings are effectively communicated.

Intent: Routine reporting of imaging findings is communicated through the usual channels established by the hospital or the imaging service. However, in urgent or other non-routine clinical situations, the imaging physician expedites the delivery of a diagnostic imaging report (preliminary or final) in a manner that reasonably ensures timely receipt of the findings. Documentation of this communication is extremely important because clinical care errors involving diagnostic imaging may relate to flaws in the chain of communication.

GM9.2.1

M There is a written policy and procedures on communication of urgent and other non-routine examination findings (e.g. critical findings/results).

Intent: An imaging service’s policy on communication can be an effective tool to promote patient care. The policy can provide guidance on the types of communications that are most critical, the individuals responsible for receiving communications and the methods of communication that are most appropriate. Situations that may require urgent or non-routine communication include:

- Findings that suggest a need for immediate or urgent intervention: Generally, these cases may occur in the emergency and surgical departments or critical care units and may include pneumothorax, pneumoperitoneum, or a significantly misplaced line or tube.
- Findings that are discrepant with a preceding interpretation of the same examination and where failure to act may adversely affect patient health. These cases may occur when the final interpretation is discrepant with a preliminary report or when significant discrepancies are encountered upon subsequent review of a study after a final report has been submitted.
- Findings that the imaging physician reasonably believes may be seriously adverse to the patient’s health and are unexpected by the treating or referring physician. These cases may not require immediate attention but, if not acted upon, may worsen over time and possibly result in an adverse patient outcome.

GM9.2.2

M Appropriate medical staff is notified by direct means (e.g. in person or by telephone) according to facility policy for communication of urgent and other non-routine findings (e.g. critical results).

See also Global Modality Accreditation Standards GM 9.2.1.

GM9.2.3

There are mechanisms to verify that the findings have been received completely and accurately (e.g. such as reading back the findings, etc.).

GM9.2.4

M Contingency plans are available in the event that the medical staff cannot be contacted.

Notification and actions taken in response to urgent, unexpected or unusual findings are documented, including:

Guidance: The name of person to whom communication was made, the date and time and method of communication is documented.

GM9.2.5

M the urgent findings.

GM9.2.6

M name of the person to whom the findings were given.

GM9.2.7

M date and time.
GM 9.3 There are policies and procedures in place to deal with corrected and addendum reports.

Definitions:
A corrected report is sent when an originally reported result or information in the report has been subsequently found to be incorrect such that a new report is issued. Significant differences in preliminary reports and subsequent reports should be treated as corrected reports.

An addendum report is sent when additional information that must be reported has become available.

GM9.3.1 M There are policies and procedures that address corrected and addendum reports.
Guidance: There are clear directions that indicate when a corrected report is required and the steps that are to be taken when issuing a corrected or addendum report.

GM9.3.2 M Corrected and addendum reports are clearly identified.

GM9.3.3 M Both the original and the new results are reported.

GM9.3.4 M The date and time the change or addition was made is recorded.

GM9.3.5 M The identity of the person making the change or addition is recorded.

GM9.3.6 M Notification of clinical staff is recorded when there is a significant discrepancy between the original and the corrected or addendum report.

INTERVENTIONAL PROCEDURES

GMIP 10.0 Sample collection processes ensure high quality samples and meet patient needs.
Guidance: When only laboratory medicine staff are involved in the collection of samples these standards will be assessed during Laboratory Medicine Accreditation.

GMIP 10.1 Samples are handled, transported, tracked and stored appropriately.
See also Infection Prevention and Control Accreditation Standards and General Safety Accreditation Standard, DSA1.11.

GMIP10.1.1 M Routine practices are used in the collection of blood and body fluids, and biopsy tissue samples.

GMIP10.1.2 M Unaltered gloves are worn during the collection of blood and body fluids, and biopsy tissue samples.

GMIP10.1.3 M Safety engineered needleless systems are used.

GMIP10.1.4 M There is a procedure for adding samples into fixatives.

GMIP10.1.5 M There is a procedure for adding samples into anticoagulants.

GMIP10.1.6 M Samples are placed in appropriate leak-proof sample containers.

GMIP10.1.7 M There is a point-to-point hand delivery system for time and/or case sensitive samples.

GMIP10.1.8 M There is proper storage of light and/or temperature sensitive sample containers.
ACCREDITATION STANDARDS
GLOBAL MODALITY

GMIP10.1.9  M  □ The identity of the staff member collecting the sample and the date and time that the sample is collected is recorded in the information system, on the requisition, or on the sample label.

GMIP10.1.10 M  □ There is a process to track the delivery of the sample to the laboratory.

GMIP10.1.11 M  □ There is a procedure for the safe disposal of cytotoxic drugs.

GMIP 10.2  Sample labeling provides information necessary to link samples to patients and distinguish samples.

GMIP10.2.1 M  □ Samples are labeled immediately after the collection process in the presence of the patient by staff collecting the sample.

Intent: Labeling samples in the presence of the patient is a measure to ensure the correct match of the sample to the correct patient. The two patient identifiers are to be affixed to the container at the time of collection. Both batch labeling and pre-labeling of sample containers are to be avoided. The moment you pre-label the container, or move an unlabeled sample away from the patient you greatly increase the potential for an error.

GMIP10.2.2 M  □ Sample containers are labeled with a minimum of two acceptable identifiers.

Guidance: The patient’s first and last name is only considered one identifier.

GMIP10.2.3 M  □ Patient labeling is written on, or attached to sample containers (not lids).

GMIP10.2.4 M  □ All samples are indelibly labeled.

GMIP10.2.5 M  □ When printed labels are affixed to the sample container after handwritten labeling of the sample, the printed label does not obscure the original handwriting.

GMIP10.2.6 M  □ Multiple samples collected from one patient at the same time are uniquely identified.

Intent: Multiple samples collected from one patient are to be distinguished from one another. Typically this is done by noting the site or providing a number on the sample label that corresponds to a site or number on the request.

GMIP10.2.7 M  □ Similar samples collected at different times are uniquely distinguished.
### ACCREDITATION STANDARDS
GLOBAL MODALITY

**GMIP 10.3**  
**Sample requisitions contain accurate, comprehensive and appropriate information.**

Information recorded on the requisition includes:

<table>
<thead>
<tr>
<th>GMIP10.3.1</th>
<th>M</th>
<th>the patient's first and last name.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GMIP10.3.2</td>
<td>M</td>
<td>a unique personal identifier number such as Provincial Health Number (PHN) or facility-issued identifier number.</td>
</tr>
<tr>
<td>GMIP10.3.3</td>
<td>M</td>
<td>date of birth.</td>
</tr>
<tr>
<td>GMIP10.3.4</td>
<td>M</td>
<td>gender.</td>
</tr>
</tbody>
</table>
| GMIP10.3.5 | M | the name and contact information of the authorized individual requesting testing.  
**Intent:** If an urgent/stat report is required the authorized individual’s contact information is provided. |
| GMIP10.3.6 | M | clear indication of authorized individual requesting testing. |
| GMIP10.3.7 | M | additional locations the report is to be sent, as required. |
| GMIP10.3.8 | M | analysis, product or service requested. |
| GMIP10.3.9 | M | sample type and anatomic site of origin. |
| GMIP10.3.10 | M | pertinent clinical information and/or information relevant for diagnosis. |
| GMIP10.3.11 | M | date and time of collection. |
| GMIP10.3.12 | M | urgency.  
**Guidance:** Any non-routine testing (e.g. STAT or urgent) is identified on the request. |
| GMIP10.3.13 | M | the presence of radioactive material or prion disease is indicated when applicable. |
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.

The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.


American Society of Anesthesiologists (ASA) Patient Classification Status. Purchased from the ASA Relative Value Guide.

SPECIFIC DOCUMENTS REFERENCED


ACCREDITATION STANDARDS 2010

RADIOLOGY

The Radiology Accreditation Standards are used in conjunction with the Global Modality Accreditation Standards.

Introduction:
In addition to the Global Modality Accreditation Standards, the modality specific Accreditation Standards for Radiology provide additional mandatory requirements and best practices for accreditation in the modality of Radiology.

The Radiology section of the Accreditation Standards address additional requirements related to:
- Examination requests
- Imaging procedures
- Medical records
- Equipment

EXAMINATION REQUEST

RA 1.0 Examination requests are standardized and ensure that accurate, comprehensive and appropriate information is relayed.

RA 1.2 Examination requests contain accurate information that is received prior to an examination being undertaken.
See also Global Modality Accreditation Standards GM 1.2.

RA1.2.1 M Outpatient requisitions for intravascular contrast agent examinations indicate recent eGFR.
Guidance: For inpatients, either the requisition or information system indicates the recent eGFR results. See also Global Modality Accreditation Standards, GM 4.4.
IMAGING PROCEDURES

RA 3.0 Standard protocols result in images appropriate for their intended use in clinical decision-making.

RA 3.1 There is a comprehensive process in place for protocol adoption and development.
See also Global Modality Accreditation Standards GM 3.1.

RA3.1.1 M Protocols are reviewed every 1-3 years by qualified individual(s).

RA 3.2 Protocols contain all the information necessary to perform the examination.
Protocol information includes, but is not limited to:

RA3.2.1 M the radiation technique.

Intent: An appropriate selection of loading factors and technique (e.g. tube voltage, current and filtration) are used with consideration to techniques appropriate to the equipment available. Particularly important for diagnostic procedures in which the gonads or breast tissues lie within or near the X-ray beam. For example, in radioscopy, use of higher tube voltage and filtration and lower tube current will almost always reduce the gonad dose.

RA3.2.2 M the equipment/supplies needed.
RA3.2.3 M the rationale for steps in procedure, included where helpful.
RA3.2.4 M a description of patient positioning.
RA3.2.5 M the type and dose of contrast agents administered.
RA3.2.6 M when guidance and/or review by a radiologist is required prior to patient discharge.

RA 3.3 Examinations are performed following established protocols.

RA3.3.1 M Protocols are readily available to staff performing the examination.
RA3.3.2 M Protocols are equipment specific, where appropriate.
RA3.3.3 M There are protocols for the pediatric population.

Intent: Examinations of infants and children are only performed using techniques and loading factors which have been modified for size and age.

RA3.3.4 M Specialized examinations are undertaken only by, or in close collaboration with a radiologist.
RA3.3.5 M Lead markers are routinely placed prior to exposure.
RA3.3.6 M Written procedures are in place for the use of electronic markers when errors/omissions are identified after exposure.
RA3.3.7 M Technique charts are reflective of the equipment used.
Images are reviewed for diagnostic quality before the patient is released.

Guidance: The number of radiographic views required in an examination is kept to the minimum practicable, consistent with the clinical objectives of the examination. If X-rays contain the required information, repeat procedures are not performed simply because the image is not of the “best” diagnostic quality.

Image review ensures the:

- RA3.4.1 M appropriate positioning and technique factors.
- RA3.4.2 M presence of artifacts and motion does not impact the diagnostic image quality.
- RA3.4.3 M evidence of exposure collimation.

Note: The X-ray beam is well-collimated to restrict it as much as is practicable to the area of diagnostic interest. It is not sufficient merely to limit the beam to the size of the image receptor. All hard-copy films show evidence of exposure collimation. For digital systems, evidence of collimation may be masked by post-processing and care should be taken by the technologist to ensure acquisition collimation was employed.

Quality Assurance processes are in place when using radioscopy as an adjunct to performance of a clinical procedure.

Intent: Radioscopy used for guidance or other non-diagnostic purposes must include documentation and image storage in the patient medical record.

- RA3.5.1 M There is capture and storage of a minimum of one image per case.

The medical record is current, accurate and contains quality diagnostic images and relevant examination details.

- RA7.2.1 M pregnancy status.
- RA7.2.2 M date of Last Menstrual Period (LMP) for examinations involving any radiation to the abdomen or pelvis on women of childbearing age.
- RA7.2.3 M an indicator of patient dose, either fluoroscopy time or preferably DAP (if available).

Guidance: The term Dose-Area Product (DAP) is a measurement of the amount of radiation that a patient absorbs. The simplest way to monitor patient exposures is with a DAP meter. DAP meters are commonly installed in DR systems, but can be used on any radiographic system such as rooms using CR and film-screen. Ideally the DAP reading is integrated into the image data collection and stored in the DICOM header. This is common for DR systems and allows any retrospective review of patient dose.

Note: Any unusually high values/variances are investigated by a medical physicist as necessary.
Accreditation Standards 2010
Diagnostic Imaging

ACCREDITATION STANDARDS
RADIOLOGY

EQUIPMENT

RAES 2.0 Equipment testing is performed prior to clinical use. 6
Note: See also the following standards: Radiation Safety Accreditation Standard, RS 5.1 and RS 5.2., radiation protection surveys and RS 4.1.1 for Radiation Emitting Devices (RED) regulations. As part of acceptance testing procedures there is verification of compliance to RED regulations for diagnostic X-ray equipment, Part XII (RS 4.1.1).

See also Equipment and Supplies Accreditation Standards DES 2.0.

RAES 2.1 Acceptance testing is performed after purchase and prior to clinical use of film-based systems.
During acceptance testing there is a process for:

RAES2.1.1 M [ ] initial inspection and inventory.
RAES2.1.2 M [ ] inspection of documentation.

Acceptance testing includes visual and functional testing of the:

RAES2.1.3 M [ ] mechanical properties.
RAES2.1.4 M [ ] safety systems.

Testing includes evaluation of the:

RAES2.1.5 M [ ] accuracy of loading factors.
Guidance: Testing is performed of the kVp accuracy (e.g X-ray tube voltage), current time product (mAs) and timer accuracy (loading time).

RAES2.1.6 M [ ] backup timer.
Intent: The back-up (or guard) timer terminates the radiographic exposure if all other systems such as the AEC or timer fail. Health Canada Safety Code 35 has not required testing of the backup timer however; this is a requirement in the RED Act and must be assessed at acceptance testing and is also strongly recommended to be assessed annually.

RAES2.1.7 M [ ] radiation output reproducibility.
RAES2.1.8 M [ ] radiation output linearity.
RAES2.1.9 M [ ] (HVL) X-ray beam filtration.
RAES2.1.10 M [ ] automatic exposure control (AEC).
RAES2.1.11 M [ ] X-ray field and light field alignment.
RAES2.1.12 M [ ] X-ray beam collimation.
RAES2.1.13 M [ ] accuracy of the dose area product meter.
RAES2.1.14 M [ ] grid performance.
RAES2.1.15 M [ ] dynamic range.
RAES2.1.16 M [ ] high contrast resolution (spatial resolution).
RAES2.1.17 M [ ] low contrast detectability (contrast detectability).
RAES2.1.18 M [ ] artifacts.

Intent: Health Canada Safety Code 35 has not required testing for artifacts however; this should be assessed at acceptance testing and is therefore also strongly recommended to be assessed annually. This is a visual test of image uniformity.

RAES2.1.19 M [ ] phantom dose measurements (phantom entrance dose rate).
RAES 2.2  Acceptance testing is performed after purchase and prior to clinical use of CR/DR systems.
During acceptance testing there is a process for:

RAES2.2.1 M initial inspection and inventory.
RAES2.2.2 M inspection of documentation.

Acceptance testing includes visual and functional testing of the:

RAES2.2.3 M mechanical properties.
RAES2.2.4 M safety systems.
   Testing includes evaluation of the:
RAES2.2.5 M accuracy of loading factors.
   Guidance: Testing is performed of the kVp accuracy (e.g X-ray tube voltage), current time product (mAs) and timer accuracy (loading time).
RAES2.2.6 M backup timer.
   Intent: The back-up (or guard) timer terminates the radiographic exposure if all other systems such as the AEC or timer fail. Health Canada Safety Code 35 has not required testing of the backup timer however; this is a requirement in the RED Act and must be assessed at acceptance testing and is therefore also strongly recommended to be assessed annually.
RAES2.2.7 M radiation output reproducibility.
RAES2.2.8 M radiation output linearity.
RAES2.2.9 M (HVL) X-ray beam filtration.
RAES2.2.10 M automatic exposure control (AEC).
RAES2.2.11 M X-ray field and light field alignment.
RAES2.2.12 M X-ray beam collimation.
RAES2.2.13 M accuracy of the dose area product meter.
RAES2.2.14 M grid performance.
RAES2.2.15 M response function.
RAES2.2.16 M exposure index.
RAES2.2.17 M dynamic range.
RAES2.2.18 M noise, uniformity and image artifacts.
RAES2.2.19 M high contrast resolution (spatial resolution).
RAES2.2.20 M low contrast detectability (contrast detectability).
RAES2.2.21 M digital detector residual image.
RAES2.2.22 M phantom dose measurements (phantom entrance dose rate).

RAES 2.3  Acceptance testing is performed after purchase and prior to clinical use of radioscopic systems.
During acceptance testing there is a process for:

RAES2.3.1 M initial inspection and inventory.
RAES2.3.2 M inspection of documentation.

Acceptance testing includes visual and functional testing of the:

RAES2.3.3 M mechanical properties.
RAES2.3.4 M safety systems.
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Testing includes evaluation of the:

RAES2.3.5 M □ accuracy of loading factors.

Guidance: Testing is performed of the kVp accuracy (e.g. X-ray tube voltage), current time product (mAs) and timer accuracy (loading time).

RAES2.3.6 M □ radiation output reproducibility.

RAES2.3.7 M □ radiation output linearity.

RAES2.3.8 M □ (HVL) X-ray beam filtration.

RAES2.3.9 M □ X-ray field and light field alignment.

RAES2.3.10 M □ X-ray beam collimation.

RAES2.3.11 M □ accuracy of the dose area product meter.

RAES2.3.12 M □ radioscopic timer and chronometer.

RAES2.3.13 M □ grid performance.

RAES2.3.14 M □ uniformity and artifacts.

Intent: Health Canada Safety Code 35 has not required testing for uniformity and artifacts however; this should be assessed at acceptance testing and is therefore also strongly recommended to be assessed annually.

RAES2.3.15 M □ high contrast resolution (spatial resolution).

RAES2.3.16 M □ low contrast detectability (contrast detectability).

RAES2.3.17 M □ maximum air kerma rate.

RAES2.3.18 M □ typical image intensifier air kerma rate.

RAES2.3.19 M □ automatic intensity control.

RAES2.3.20 M □ phantom dose measurements (phantom entrance dose rate).

RAES 3.0 Quality Assurance programs are established to ensure the attainment of intended quality. See also Equipment and Supplies Accreditation Standards DES 3.0.

Film-based systems

RAES 3.1 Daily Quality Control procedures are established and used to monitor performance of film-based systems that includes:

Guidance: Daily Quality Control tests are performed at the beginning of each day before commencing patient examinations. Film processor function is evaluated every morning before performing clinical examinations, after the processor has been turned on and has reached the required development temperature; and at other times as required, such as after a replenishment rate change.

RAES3.1.1 M □ performing manufacturer’s recommended equipment warm-up.

RAES3.1.2 □ assessment of meters operation.

Guidance: Meters and visual and audible indicators are checked for proper operation.

RAES3.1.3 □ assessment of equipment conditions.

Guidance: X-ray equipment conditions are visually inspected for loose or broke components and cleanliness. The X-ray source assembly is checked for motion or vibration during operation. Visual inspection is also conducted of all other components of the imaging systems.
RAES3.1.4 M ☐ the film processing solution levels being checked to ensure agreement with the manufacturers’ recommended baseline levels for the particular processor and film type, for the given number of films processed daily.

RAES3.1.5 M ☐ the displayed processor temperature being checked to ensure agreement with the manufacturers recommended baseline level for the particular processor and film used.

RAES3.1.6 M ☐ sensitometric strip processing being performed in order to monitor the performance of the image processing system.

RAES3.1.7 ☐ assessment of darkroom cleanliness.

Guidance: In order to maintain the cleanliness of the darkroom all working surfaces, tops of counters and the floor are cleaned daily. Dust and debris can more easily be seen using a UV-B lamp.

RAES 3.2 Weekly Quality Control procedures are established and used to monitor performance of film-based systems that includes:

RAES3.2.1 M ☐ visual inspection of cleanliness of film/screens.

Intent: In the use of film/screen systems a new film is used for every exposure. However, the screens are used repeatedly and can become dirty and damaged over time (Open cassettes and clean screen if necessary).

RAES 3.3 Monthly Quality Control procedures are established and used to monitor performance of film-based systems that includes:

Guidance: Facilities performing spot-filming also perform quality control tests on the film processing system.

RAES3.3.1 M ☐ cassettes and screens being cleaned and inspected for damage.

Guidance: Cassette and screens are checked for cleanliness, wear, warping, fatigue of foam compression material and closure mechanism, and light leaks. All screens are cleaned. Manufacturer recommended cleaners and cleaning procedures are used. An inspection for dust particles is done with an ultraviolet light. Damaged plates are replaced as necessary.

RAES3.3.2 M ☐ the accuracy of the processor temperature display being checked against a non-mercury thermometer. The processor developer temperature is accurate to within ±0.5ºC.

RAES3.3.3 M ☐ the replenishment rate being compared with the manufacturers’ recommended baseline level for the particular processor and film type, for the given number of films processed daily and for the method of processing.

RAES3.3.4 ☐ all processing solutions being changed, processor solution tanks being cleaned, and rollers and crossovers being cleaned.

RAES3.3.5 ☐ fixer retention tests being performed to ensure fixer is adequately removed from processed films.
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**RAES 3.6**  
- M ☐ assessment of darkroom light conditions.  
  *Guidance: A visual test is performed in the darkroom to ensure the room is light tight. Particular attention is paid to the door seal and the mounting of the film processor, if the film insertion to the processor is done through a wall. The assessment of darkroom light conditions is made after a 10 to 15 minute period of adaptation to the dark conditions with safelights turned off.*

**RAES 3.7**  
- ☐ assessment of darkroom temperature and humidity conditions.  
  *Guidance: A check of the darkroom temperature and humidity is conducted. The temperature is between 18-23 degrees C and the humidity between 40% and 60%*

**RAES 3.4**  
- Monthly Retake Analysis is routinely performed to monitor the quality of images and the cause of non-diagnostic images.  
  *Intent: The facility has a program established to prevent the total loss of any images without review for reject analysis. Analysis is reviewed with relevant staff and identifies opportunities for improvement and sets priorities.*  
  - M ☐ Records are retained of every repeat, including the reason for the repeat along with any corrective actions, immediately after the repeat film is taken.  
  - M ☐ Monthly analysis is done of the retake records to identify and correct any trends or repeated errors.  
  - ☐ The retake rate is less than 5%, not including quality control films.

**RAES 3.5**  
- Quarterly Quality Control procedures are established and used to monitor performance of film-based systems that includes:  
  - ☐ assessment of collimator operation.  
    *Guidance: Using each collimating option, a test is performed to ensure smooth collimator blade motion. If applicable, vary the SID to assure the collimator tracks (i.e., automatically maintain the field size) as the SID changes.*  
  - M ☐ assessment of interlocks.  
    *Guidance: Interlocks are uncommon. If there are interlocks on the door(s), they are tested to ensure that they prevent the X-ray equipment from producing radiation when the door is open.*

**RAES 3.6**  
- Annual Quality Control procedures are established and used to monitor performance of film-based systems.  
  *Testing includes the following:*  
  - M ☐ a safelight test.  
    *Guidance: Expose film for 2 minutes in room.*  
  - M ☐ an assessment of film/screen contact.  
    *Guidance: Image mesh and check.*

  *Testing includes evaluation of the:*  
  - M ☐ accuracy of loading factors.  
  - M ☐ radiation output reproducibility.
RAES 3.6.5 M □ radiation output linearity.
Guidance: Output with mAs.

RAES 3.6.6 M □ (HVL) X-ray beam filtration.

RAES 3.6.7 M □ automatic exposure control (AEC).
Guidance: Check AEC for all kVps and thicknesses.

RAES 3.6.8 M □ X-ray field and light field alignment.
Guidance: Congruency of x-ray beam and light field edges.

RAES 3.6.9 M □ X-ray beam collimation.
Guidance: Congruency of x-ray beam and light field centres.

RAES 3.6.10 M □ accuracy of dose area product meter
Guidance: fitted DAP meters are calibrated.

RAES 3.6.11 M □ grid performance.
Guidance: Check uniformity and movement of grid.

RAES 3.6.12 M □ dynamic range.

RAES 3.6.13 M □ high contrast resolution (spatial resolution).

RAES 3.6.14 M □ low contrast detectability (contrast detectability).

RAES 3.6.15 M □ artifacts.

RAES 3.6.16 M □ phantom dose measurements.
Guidance: Measure dose at surface of standard phantom.

**Computed Radiography (CR) and Digital Radiography (DR) systems**

**RAES 3.7** Daily Quality Control procedures are established and used to monitor performance of CR/DR systems that includes:

RAES 3.7.1 M □ performing manufacturer’s recommended equipment warm-up.

RAES 3.7.2 M □ assessment of meters operation.
Guidance: Meters and visual and audible indicators are checked for proper operation.

RAES 3.7.3 M □ assessment of equipment conditions.
Guidance: X-ray equipment conditions are visually inspected for loose or broke components and cleanliness. The X-ray source assembly is checked for motion or vibration during operation. Visual inspections are also conducted of all other components of the imaging systems.

**RAES 3.8** Weekly Quality Control procedures are established and used to monitor performance of CR/DR systems that includes:

RAES 3.8.1 M □ for CR systems, the imaging plates being visually inspected (dust/dirt).
Guidance: Open CR plates and clean if necessary using a manufacturer recommended cleaner.

RAES 3.8.2 M □ for DR systems, the image receptors being visually inspected (DR housing- e.g. surface of detectors).
Guidance: The image receptors are kept clean of dust, dirt and other items which may come into contact with them. Clean, as necessary.
RAES  3.9  Monthly Quality Control procedures are established and used to monitor performance of CR/DR systems that includes:

RAES3.9.1  M □ Imaging plates being cleaned and inspected for damage (dust/dirt/damage).

Guidance: Imaging plates are checked for cleanliness, wear, warping, fatigue of foam compression material and closure mechanism, and light leaks. All imaging plates are cleaned. Manufacturer recommended cleaners and cleaning procedures are used. An inspection for dust particles is done with an ultraviolet light. Any damaged plates are replaced.

RAES  3.10  Monthly Retake Analysis is routinely performed to monitor the quality of images and the cause of non-diagnostic images.

Intent: The facility has a program established to prevent the total loss of any images without review for reject analysis. Analysis is reviewed with relevant staff and identifies opportunities for improvement and sets priorities.

RAES3.10.1  M □ Records are retained of every repeat, including the reason for the repeat along with any corrective actions, immediately after the repeat film is taken.

RAES3.10.2  M □ Monthly analysis is done of the retake records to identify and correct any trends or repeated errors.

RAES3.10.3  □ The retake rate is less than 5%, not including quality control films.

RAES  3.11  Quarterly Quality Control procedures are established and used to monitor performance of CR/DR systems that includes:

RAES3.11.1  □ Assessment of collimator operation.

Guidance: Using each collimating option, a test is performed to ensure smooth collimator blade motion. If applicable, vary the SID to assure the collimator tracks (i.e., automatically maintain the field size) as the SID changes.

RAES3.11.2  M □ Assessment of interlocks.

Guidance: Interlocks are uncommon. If there are interlocks on the door(s), they are tested to ensure that they prevent the X-ray equipment from producing radiation when the door is open.

RAES  3.12  Annual Quality Control procedures are established and used to monitor performance of CR/DR systems.

Testing includes evaluation of the:

RAES3.12.1  M □ Accuracy of loading factors.

RAES3.12.2  M □ Radiation output reproducibility.

RAES3.12.3  M □ Radiation output linearity.

Guidance: Output with mAs.

RAES3.12.4  M □ X-ray beam filtration.

RAES3.12.5  M □ Automatic exposure control (AEC).

Guidance: Check AEC for all kVps and thicknesses.

RAES3.12.6  M □ X-ray field and light field alignment.

Guidance: Congruency of X-ray beam and light field edges.
RAES 3.12

M □ X-ray beam collimation.
   Guidance: Congruency of X-ray beam and light field centres.

M □ accuracy of dose area product meter
   Guidance: fitted DAP meters are calibrated.

M □ grid performance.
   Guidance: Check uniformity and movement of grid.

M □ exposure index.
   Guidance: Exposure index versus Dose 1 to 50µGy.

M □ noise, uniformity and image artifacts.

M □ spatial resolution.

M □ dynamic range.

M □ low contrast detectability (contrast detectability).

M □ digital detector residual images.

M □ phantom dose measurements.
   Guidance: Measure dose at surface of standard phantom.

Radioscopic systems (e.g. fluoroscopy and angiography)

Note: Quality control procedures for darkrooms, film processor function, and film-screens are defined in the film-based system section of the Radiology Accreditation Standards.

RAES 3.13

Daily Quality Control procedures are established and used to monitor performance of radioscopic systems that includes:

M □ performing manufacturer’s recommended equipment warm-up.

M □ meters operation.
   Guidance: Meters and visual and audible indicators are checked for proper operation.

M □ assessment of equipment conditions.
   Guidance: X-ray equipment conditions are visually inspected for loose or broke components and cleanliness. The X-ray source assembly is checked for motion or vibration during operation. Visual inspections are conducted of all other components of the imaging systems.

M □ assessment of system movements.
   Guidance: System movement is checked for proper function. For systems where the X-ray source is below the table, verify the performance of the power assist and locks by moving the tower in all directions. For systems where the X-ray source is above the table, verify the motion of the X-ray tube assembly.
Weekly Quality Control procedures are established and used to monitor performance of radioscopic systems that includes:

- **RAES 3.14.1** visual inspection of cleanliness of imaging systems.
  
  **Intent:** Fluoroscopy and angiography system procedures often use radio-opaque contrast media. The image intensifier or digital detector housing is checked for any such material which might produce artifacts on the images. Imaging systems are inspected for dust and dirt on or near the image reception area where they may negatively affect image quality.

- **RAES 3.14.2** assessment of digital subtraction angiography system.
  
  **Guidance:** Following equipment warm up and prior to clinical use, the image quality of the DSA system is evaluated using a phantom containing image quality test objects to evaluate the consistency of the system.

Quarterly Quality Control procedures are established and used to monitor performance of radioscopic systems.

Testing includes evaluation of the:

- **RAES 3.15.1** collimator operation.

- **RAES 3.15.2**
  
  **M** interlocks.

  **Guidance:** Interlocks are uncommon. If there are interlocks on the door(s), they are tested to ensure that they prevent the X-ray equipment from producing radiation when the door is open.

- **RAES 3.15.3**
  
  **M** table angulation and motion.

  **Guidance:** Confirm the table moves freely to the upright position and stops at the appropriate spot.

- **RAES 3.15.4**
  
  **M** compression devices operation.

  **Guidance:** Confirm that the available compression devices easily move in and out of the X-ray beam and function correctly.

- **RAES 3.15.5**
  
  **M** chronometer operation.

  **Guidance:** The chronometer accuracy is verified with a stopwatch.

- **RAES 3.15.6**
  
  **M** park position interrupt.

  **Guidance:** Confirm that when the image receptor is in the parked position it is not possible to energize the X-ray tube. This may be checked while wearing a lead apron and depressing the radioscopic irradiation switch to see if the system is activated.

- **RAES 3.15.7**
  
  **M** protective devices used for radioscopic equipment.

  **Guidance:** Conduct a visual assessment of the condition of the protective curtain or drape to ensure that the operator is not subject to any unnecessary scatter radiation. A protective curtain or drape, of at least 0.25 mm lead equivalence at 100 kV, is in place and move freely so that it can be placed between the patient and any personnel in the radioscopic room. Lead drapes may be affixed to the image intensifier (under table systems) or the patient table (over table systems) Check that there are no creases that may subject the operator to unnecessary scatter radiation. If the unit is an under table radioscopic system, check that the shield covering the cassette holder entrance (e.g. during radioscopy) is working as intended.
Annual Quality Control procedures are established and used to monitor performance of radioscopic systems.

Testing includes evaluation of the:

- RAES3.16.1 M □ accuracy of loading factors.
- RAES3.16.2 M □ radiation output reproducibility.
- RAES3.16.3 M □ radiation output linearity.
  
  Guidance: Output with mAs.
- RAES3.16.4 M □ X-ray beam filtration.
- RAES3.16.5 M □ X-ray field and light field alignment.
  
  Guidance: Congruency of X-ray beam and light field edges.
- RAES3.16.6 M □ X-ray beam collimation.
  
  Guidance: Congruency of X-ray beam and light field centres.
- RAES3.16.7 M □ accuracy of the dose area product meter
  
  Guidance: Fitted DAP meters are calibrated.
- RAES3.16.8 M □ grid performance.
  
  Guidance: Check uniformity and movement of grid.
- RAES3.16.9 □ uniformity and artifacts.
- RAES3.16.10 M □ high contrast resolution (spatial resolution).
  
  Guidance: Line-pair or Leeds phantom.
- RAES3.16.11 □ low contrast detectability (contrast detectability).
  
  Guidance: Leeds phantom
- RAES3.16.12 M □ maximum image intensifier air kerma rate.
- RAES3.16.13 □ typical image intensifier air kerma rate.
  
  Guidance: Using a uniform phantom placed on the patient support, measurements of the typical entrance air kerma rate, including backscatter, are made for all geometries and modes of operation used clinically. The values are within established levels.
- RAES3.16.14 M □ automatic intensity control.
  
  Guidance: Tracking of detector dose with phantom thickness.
- RAES3.16.15 M □ phantom dose measurements.
  
  Guidance: Measure dose at surface of standard phantom.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.

The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.


SPECIFIC DOCUMENTS REFERENCED


ACCREDITATION STANDARDS 2010

MAMMOGRAPHY

The Mammography Accreditation Standards are used in conjunction with the Global Modality Accreditation Standards.

Introduction:
In addition to the Global Modality Accreditation Standards, the modality specific Accreditation Standards for Mammography provide additional mandatory requirements and best practices for accreditation in the modality of Mammography.

The Mammography section of the Accreditation Standards address additional requirements related to:
- Patient preparation
- Imaging procedures
- Medical records
- Equipment
- Digital Mammography equipment and quality assurance

PATIENT PREPARATION

MA 2.0 Patients are appropriately prepared for the examination being performed.

MA 2.2 Pre-examination information is collected and assessed prior to commencing the examination.

See also Global Modality Accreditation Standards GM 2.2.

MA2.2.1 M □ The patient history is documented on a history sheet and remains a permanent part of the patient record.

Intent: The nature and site of clinical or mammography concern should be documented prior to the examination and acknowledged in the report. The location should be described according to various conventions including the clock face position, distance from the nipple, breast quadrant and location within the coronal plane.
IMAGING PROCEDURES

MA 3.0 Standard protocols result in mammograms appropriate for their intended use in clinical decision-making.

MA 3.1 There is a comprehensive process in place for protocol adoption and development.

See also Global Modality Accreditation Standards GM 3.1.

MA3.1.1 M Protocols are reviewed on a regular basis by qualified individual(s).

MA 3.2 Protocols contain all the information necessary to perform the examination.

Protocol information includes, but is not limited to:

MA3.2.1 M the radiation technique.

MA3.2.2 M the equipment/supplies needed.

MA3.2.3 M a description of patient positioning.

MA 3.3 Examinations are performed following established protocols.

MA3.3.1 M Protocols are readily available to staff performing the examination.

MA3.3.2 M Protocols are equipment specific, where appropriate.

MA3.3.3 M Markers are placed near the axilla for identification of laterality and view do not obscure image information.

MA3.3.4 Areas of interest are marked using opaque devices to confirm that the area of interest was included on the image and to provide positioning guidance. Guidance: Appropriate markers may be used to identify areas of clinical concern, areas of prior intervention, skin abnormalities, etc. and to help correlate them with ultrasound findings. Radiographic demonstration of surface markers may provide positioning guidance for routine views, spot compression, tangential, and other views. The markers and type of lesion marked are identified on the image itself or, in the case of digital images, in the report or printed at the bottom of all reports. This is especially important when reports and mammograms are sent to other facilities.

MA3.3.5 The area of concern is placed closest to the image receptor.

MA3.3.6 Routine views include craniocaudal and mediolateral oblique projections.

MA3.3.7 Implant evaluation includes implant displacement views.

MA3.3.8 Additional views such as spot compression, spot compression with magnification, tangential views, views with markers and other specialized views are ordered by the radiologist.

MA3.3.9 In the case of a patient call back for additional views, the follow-up is expedited to ensure the timely interpretation of the examination.

MA3.3.10 Surgical specimen radiography involves the direct communication between the surgeon and the radiologist to ensure adequacy of excision.
MA 3.4 Mammograms are reviewed for diagnostic quality before the patient is released. Mammogram review ensures the:

MA3.4.1 M appropriate positioning and technique factors.
MA3.4.2 M presence of artifacts and motion does not impact the diagnostic image quality.
MA3.4.3 M use of standardized image identification.
MA3.4.4 M For digital systems, there is a quality assurance process to verify the Picture Archiving and Communication System (PACS) study description corresponds to the study performed and images acquired.

Guidance: Prior to interpretation, all digitally acquired images are verified for number of images, markers, and study description in PACS. Optimally this is performed by the individual acquiring the images.

MEDICAL RECORD

MA 7.0 The medical record is current, accurate and contains quality diagnostic images and relevant examination details.

MA 7.1 Displayed mammographic images are labeled in a standardized way that allows for proper patient identification and annotation that includes:

MA7.1.1 M the technologist’s initials.
MA7.1.2 M for film based systems, the cassette screen number is identified.
MA7.1.3 M for CR systems, the imaging plate number is identified.
MA7.1.4 M for DR systems, the station (unit) number is identified.

MA 7.2 Comprehensive examination details are recorded in the medical record that includes:

MA7.2.1 M pregnancy status.
MA7.2.2 date of Last Menstrual Period (LMP) for women of child-bearing age.

INTERPRETATION AND REPORTS

DM 8.0 Diagnostic reports are in a standardized format that provides comprehensive and necessary information for clinical decision-making.

DM 8.3 A timely and accurate final report is issued for all examinations.

DM8.3.1 M For primary display workstations, during the interpretation, all images are viewed at least once at 1:1 or 100% size (e.g. full resolution).
EQUIPMENT

MAES 1.0 Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

MAES 1.1 Equipment specifications ensure diagnostic quality and include the following:

MAES1.1.1 □ dedicated mammography X-ray equipment is used and conforms to Health Canada Safety Codes (RED regulations, and Health Canada Safety Code [HCSC] 33).^5

MAES1.1.2 □ specimen radiography is performed on a dedicated mammography unit or a specialized radiographic unit designed for specimen work.^3

MAES 1.2 An annual medical physicist assessment ensures radiation safety, equipment performance, image quality, and an established and effective quality assurance program.

Note: HCSC33 requires that a radiation protection inspection be established on a regular basis to assess and ensure equipment functions properly and according to Health Canada regulations and safety codes. Performance of digital display systems is tested to verify performance according to DICOM Grayscale Standard Display Function (GSDF) and recalibrated if necessary. See also Mammography Accreditation Standard DMES3.5.2.

MAES1.2.1 □ At least annually, equipment performance is evaluated and monitored and a quantitative dose determination is conducted by a qualified medical physicist.^6

MAES1.2.2 □ The medical physicist report is circulated to all mammography staff and retained at the facility.

MAES1.2.3 □ The medical physicist report is submitted to the Diagnostic Accreditation Program.

MAES 2.0 Equipment testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES2.1.

MAES 2.1 Acceptance testing is performed by a medical physicist after purchase and prior to clinical use of mammography X-ray equipment.^7

Note: See also Radiation Safety Accreditation Standards, RS 4.1.1, RED regulations. As part of acceptance testing procedures there is verification of compliance to Radiation Emitting Devices (RED) regulations for diagnostic X-ray equipment, Part XII (RS 4.1.1). Acceptance testing is required when upgrading from film-screen systems to CR systems. Digital mammography standards are evolving. Testing for Full Field Digital Mammography (FFDM) systems will be performed according to manufacturer’s recommendations or additional procedures defined by the medical physicist.

During acceptance testing there is a process for:

MAES2.1.1 □ initial inspection and inventory.

MAES2.1.2 □ inspection of documentation.

Acceptance testing includes visual and functional testing of the:

MAES2.1.3 □ mechanical properties.

MAES2.1.4 □ safety systems.
Testing includes evaluation of the:

- **MAES2.1.5** X-ray beam filtration and radiation beam quality.
- **MAES2.1.6** X-ray tube voltage accuracy and reproducibility.
- **MAES2.1.7** Irradiation timer accuracy and reproducibility.
- **MAES2.1.8** Reproducibility of radiation output.
- **MAES2.1.9** Focal spot size.
- **MAES2.1.10** Proper radiation beam alignment.
- **MAES2.1.11** Light field/x-ray image receptor congruence.

Testing includes evaluation of ancillary components for:

- **MAES2.1.12** Source to image receptor distance indicators accuracy.
- **MAES2.1.13** Compression device design and performance.
- **MAES2.1.14** Bucky system and grid performance.

Testing includes evaluation of automatic exposure control (AEC) for:

- **MAES2.1.15** Reproducibility.
- **MAES2.1.16** X-ray tube voltage compensation.
- **MAES2.1.17** Minimum response time.
- **MAES2.1.18** Thickness compensation response.
- **MAES2.1.19** Optical density setting response.
- **MAES2.1.20** Backup timer.

Testing includes evaluation of films, screens and cassettes for:

- **MAES2.1.21** Adequacy of film-screen combination.
- **MAES2.1.22** Film-screen speed uniformity.
- **MAES2.1.23** Film-screen contact.
- **MAES2.1.24** Screen condition.

Testing includes evaluation of viewboxes for:

- **MAES2.1.25** Brightness.
- **MAES2.1.26** Light output uniformity.
- **MAES2.1.27** Light output.
- **MAES2.1.28** Homogeneity.
- **MAES2.1.29** Ambient light control.

Testing includes evaluation of image processing for:

- **MAES2.1.30** Light tightness.
- **MAES2.1.31** Safelight conditions.
- **MAES2.1.32** Cleanliness.
- **MAES2.1.33** Temperature control of water supply.
- **MAES2.1.34** Ventilation system.
- **MAES2.1.35** Fixer recovery system.

Testing includes evaluation of film processing for:

- **MAES2.1.36** Condition of processing equipment.
- **MAES2.1.37** Film speed and contrast.
- **MAES2.1.38** Level of film base plus fog.
MAES 2.1.39 M □ solution temperature.
MAES 2.1.40 M □ replenishment rate.
MAES 2.1.41 M □ fixer retention analysis.

Testing includes evaluation of imaging characteristics for:

MAES 2.1.42 M □ representative breast surface dose with mean glandular dose calculations.
MAES 2.1.43 M □ dose calculations.
MAES 2.1.44 M □ image spatial resolution.
MAES 2.1.45 M □ image contrast.
MAES 2.1.46 M □ image quality.

MAES 3.0 Quality Assurance programs are established to ensure the attainment of intended quality.

Reference: Quality Control procedures for film-based systems, Screening Mammography Program of BC Quality Assurance program.
See also Equipment and Supplies Accreditation Standards DES 3.0.

MAES 3.1 Quality Control (QC) procedures are performed by staff knowledgeable in the testing procedures.

MAES 3.1.1 M □ There is a designated QC technologist who oversees the QC program.

Guidance: The designated QC technologist can designate the performance of the tests and processes to other technologists.

Film-based systems

MAES 3.2 Daily Quality Control procedures are established and used to monitor performance of film-based systems that includes:

Guidance: Daily Quality Control tests are performed at the beginning of each day that mammography is conducted before processing any patient films. The assessment of the processor function is conducted after the processor has reached the required development temperature and at other times as required, such as after a replenishment rate change.

MAES 3.2.1 M □ performing daily sensitometry.
MAES 3.2.2 M □ assessment of darkroom cleanliness.

Guidance: In order to maintain the cleanliness of the darkroom all working surfaces, tops of counters and the floor be cleaned daily. Dust and debris can more easily be seen using a UV-B lamp.

MAES 3.2.3 M □ the film processing solution levels being checked to ensure agreement with the manufacturers’ recommended baseline levels for the particular processor and film type, for the given number of films processed daily.

MAES 3.2.4 M □ the film processing solution temperature being checked, using a non-mercury thermometer, to ensure agreement with the manufacturers’ recommended baseline level for the particular processor and film used.
ACCREDITATION STANDARDS
MAMMOGRAPHY

MAES  3.3  **Weekly Quality Control procedures are established and used to monitor performance of film-based systems that includes:**

MAES3.3.1  M ☐ image quality evaluation tests being performed using a phantom.
Guidance: While it is strongly recommended that this test be performed daily, this test is to be performed at least weekly. A uniform phantom representing average breast thickness is routinely used to monitor and maintain image density to ensure correct optical density, the absence of excessive artifacts, and a consistent current time product setting.

MAES3.3.2  M ☐ a phantom, with image quality evaluation objects, being used to test imaging performance of the mammographic X-ray system.

MAES3.3.3  M ☐ a visual test being performed in the darkroom to ensure the room is light tight.
Guidance: Particular attention is to be paid to the door seal and the mounting of the film processor if the film insertion to the processor is done through a wall.

MAES3.3.4  M ☐ screens being checked for cleanliness and damage.
Guidance: Manufacturer recommended screen cleaner is to be used. An inspection for dust particles is done with an ultraviolet light.

MAES3.3.5  M ☐ cassettes being checked for cleanliness, wear, warping, fatigue of foam compression material and closure mechanism, light leaks.

MAES3.3.6  M ☐ the cassette holder tunnel being checked for dust and dirt.

MAES  3.4  **Monthly Quality Control procedures are established and used to monitor performance of film-based systems that includes:**

MAES3.4.1  M ☐ mammography X-ray equipment being visually inspected for loose or broken components.

MAES3.4.2  M ☐ the replenishment rate being compared with the manufacturers’ recommended baseline level for the particular processor and film type, for the given number of films processed daily and for the method of processing.

MAES3.4.3  M ☐ processor cleaning (e.g. rollers, crossovers, etc.).

MAES  3.5  **Monthly Retake Analysis is performed to monitor the quality of images and the cause of non-diagnostic images for both film-based and digital systems.**
The facility has a program established to prevent the total loss of any images without review for reject analysis. Analysis is reviewed with relevant staff and identifies opportunities for improvement and sets priorities.

MAES3.5.1  M ☐ Records are retained of every repeat, including the reason for the repeat along with any corrective actions, immediately after the repeat film is taken.

MAES3.5.2  M ☐ Monthly analysis is done of the retake records to identify and correct any trends or repeated errors.

MAES3.5.3  M ☐ The repeat rate is between 2 and 5 percent, not including Quality Control films.
MAES 3.6  **Quarterly** Quality Control procedures are established and used to monitor performance of film based systems that includes:

MAES3.6.1  fixer retention tests being performed to ensure the fixer is adequately removed from processed films according to baseline levels.

MAES 3.7  **Semi-Annual** Quality Control procedures are established and used to monitor performance of film based systems that includes:

MAES3.7.1  performing darkroom fog tests.

MAES3.7.2  performing breast compression device tests.

  Guidance: The maximum compression force for the initial power drive is between 11.4 kg (25 lbs) and 20.5 kg (45 lbs).

MAES3.7.3  assessment of screen/film contact.

  Guidance: All cassettes used in mammography are tested for screen/film contact using a 16 mesh/cm (40 mesh/in) copper screen. Large areas greater than 1 cm in diameter of poor contact that are not eliminated by screen cleaning and remain in the same location during subsequent tests are replaced. Multiple small areas, less than 1 cm in diameter, are acceptable.

MAES 3.8  Quality Control procedures are established and used to monitor performance of Full-Field Digital Mammography (FFDM) systems.

  Guidance: QC procedures for digital mammography units are evolving. Until, recognized standards are developed and to ensure some level of Quality Control, using the manufacturer’s recommended procedures or additional procedures defined by the medical physicist is recommended.

MAES3.8.1  QC procedures for digital mammography units are performed according to manufacturer’s recommendations or as recommended by the medical physicist.
DIGITAL MAMMOGRAPHY EQUIPMENT

These standards pertain to final diagnostic interpretation for digital mammography. These technical standards focus primarily on the acquisition and display requirements for digital mammography. Digital mammography standards are still evolving and these standards are therefore subject to change.

To specify IHE capabilities as requirements on the information systems (such as PACS, RIS, acquisition modalities and review workstations) when you are purchasing or upgrading systems, reference the Integrating the Healthcare Enterprise (IHE) Radiology: Mammography User's Handbook.  

**Intent:** The IHE Mammography Image Profile as applied to the digital mammography modality ensures that the acquired digital mammography images contain all relevant information that is necessary for further image processing, application of Computer-Aided Detection (CAD), storage, display and review and printing. This profile is absolutely necessary for generating correct digital mammography image content and to ensure optimal presentation of images at the mammography display workstation.


**Definitions:**

The IHE Technical Framework delineates standards-based transactions among systems (generically defined as *IHE Actors*) required supporting specific workflow and integration capabilities. Information systems or applications that produce, manage or act on information are represented as functional units called IHE Actors. Each actor supports a specific set of IHE transactions. A given information system may support one or more IHE actors. Transactions are exchanges of information between actors using messages based on established standards (such as HL7 and DICOM).

*Primary display systems* are those used for the interpretation of medical images. In prior literature, primary display systems have sometimes been referred to as “diagnostic” monitors.

*Secondary display systems* are those used for viewing medical images for purposes other than for providing a medical interpretation. In this class of displays, there are also operator’s console monitors and quality control (QC) workstations, display devices that are commonly used to “adjust” the images before they are sent to PACS or hard-copy printers. As the performance of these systems (especially their luminance response) directly impacts image presentation at other display devices, their performance needs to maintain a minimum level of acceptability. Ideally, they comply with the luminance response requirements of primary displays. In other aspects, they may be treated as secondary class displays. In prior literature, secondary display systems have sometimes been referred to as “clinical” monitors.

There are three categories or systems for digital image data when used for rendering the official interpretation:

- **Small matrix systems**- (computed tomography [CT], magnetic resonance imaging [MRI], ultrasound, nuclear medicine)
- **Large matrix systems**- (digital radiography and digitized radiographic films)
- **Extra large matrix systems**- (digital mammography)
ACCREDITATION STANDARDS
MAMMOGRAPHY

DMII 2.0  Appropriate equipment is used for acquisition, communication, display, and storage of images.

DMII 2.1  Digitization equipment is capable of digital resolution acceptable for rendering the official interpretation.

Intent: In occasional circumstances, the digital conversion of hard copy or analogue images may be necessary. The laser scanning digitizer used does not reduce the digital resolution below that considered an acceptable threshold.

DMII2.1.1  Images are digitized to a matrix size corresponding to 5.0 lp/mm (100 micron wide detector elements) or greater, measured in the original detector plane.
DMII2.1.2  Images are digitized to a minimum of 10 bits pixel depth.

DMII 2.2  Technologies utilized for acquiring and generating digital images result in diagnostic quality images.

DMII2.2.1  M  Mammography primary acquisition devices conform to the IHE Mammography Image Profile including the acquisition actor.
DMII2.2.2  Digitizers used for mammography have been certified for mammography by the equipment manufacturer and conform to the IHE Mammography Image Profile.
DMII2.2.3  In order to meet the technologist’s needs, the acquisition and/or technologist review workstation display monitor(s) has resolution and luminance characteristics similar to that of the primary display workstation (e.g. radiologist’s mammography reporting workstation).
DMII2.2.4  Secondary monitors used for clinical decisions have a minimum resolution of 3 megapixels.

DMII 2.3  Current and historical clinical data can be accessed by staff and clients when needed.

DMII2.3.1  Digital mammography facilities have access to a printer capable of printing images for review by another non-digital mammography facility in a timely fashion.

Intent: At the time of the release of these standards, some mammography facilities with film-based systems may not have the capability to display digital mammograms.

DMII2.3.2  The images are printed on a FDA/HC approved mammography printer, utilizing film specifically designed for mammography images.

DMII 2.4  Primary display system (e.g. radiologist’s mammography reporting workstation) capabilities are appropriate for the examinations being interpreted.

DMII2.4.1  Display workstations conform to the IHE Mammography Image Profile including the display actor.

Note: Non-compliant primary display systems are required to upgrade by July 2011.
DMII2.4.2  A minimum of two portrait set-up monitors or equivalent is used and the resolution of each monitor is at a minimum 5 megapixels.
DMII2.4.3  Luminance ratio is ≥ 250:1 under normal reading conditions.
DMII2.4.4  Maximum luminance is 450cd/m² or higher to maintain a desired luminance ratio.
DMII2.4.5  Ideally, workstations allow multi-modality image viewing of associated breast imaging studies (e.g. ultrasound, MRI, biopsy specimens, other pertinent studies).
**DMII 2.5**  Primary display system reporting environments are established considering patient confidentiality, ergonomics and environmental issues.

<table>
<thead>
<tr>
<th>DMII2.5.1</th>
<th>Environments are optimized to avoid screen glare, extraneous light and reflections.</th>
</tr>
</thead>
</table>
| DMII2.5.2 | Ambient light is low and consistent, particularly in a hybrid viewing environment where stray light from bright image illuminations can be detrimental when displaying softcopy images.  
  **Guidance:** For mammograms and X-rays it is recommended that the ambient light within the reading environment be less than 10 lux. An appropriate ambient level is to be determined based upon these recommendations. For comparison with other modalities such as CT, MR and US it is recommended that the ambient light within the reading room be in the range of 15–60 lux.  
  |<sup>15</sup> |
| DMII2.5.3 | Lighting controls are used, particularly in environments where many kinds of images are being read and/or hardcopy and softcopy images are being interpreted in the same environment. |
| DMII2.5.4 | Incandescent lights are utilized, with “natural” light simulation color filters, if possible. |
| DMII2.5.5 | Display workstations are placed with consideration for optimal ergonomics. |
| DMII2.5.6 | Display workstations are in locations that do not compromise patient confidentiality. |
| DMII2.5.7 | Users are taught to exercise reasonable care and caution to protect any clinical information being displayed on computer screens from casual observance. |
| DMII2.5.8 | Display workstations are configured to automatically log-off when inactive for a predetermined length of time. |
| DMII2.5.9 | Environments are optimized for environmental considerations such as heat and noise. |

**DMII 2.6**  The digital archive ensures the appropriate images are available for interpretation.

| DMII2.6.1 | “For presentation” images are stored.  
  **Note storage of “for processing” is optional (e.g. data used for quantitative analysis).”**  
  |<sup>16</sup> |
| DMII2.6.2 | Lossless compression is utilized for transmission and storage of mammography images. |

**DMII 2.7**  Appropriate consideration is made prior to using Computer-Aided Detection.

| DMII2.7.1 | All mammography CAD algorithms use “for processing” rather than “for presentation” image data, as many mammography CAD algorithms already apply various levels of processing.  
  |<sup>17</sup> |
**EQUIPMENT**

**DMES 1.0** Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

**DMES 1.2** Medical imaging devices and ancillary equipment are appropriately operated and maintained.

**DMES 1.2.1** M Existing and new medical and technical staff members receive appropriate training and orientation on the use of digital mammography equipment prior to clinical use. 
Intent: To acknowledge the significant differences between film-screen and digital mammography.

**QUALITY ASSURANCE**

**DMES 3.0** Quality Assurance programs are established to ensure the attainment of intended quality.

**DMES 3.5** Quality Control procedures are established and used to monitor performance of electronic display devices used for interpretation (e.g. the radiologist’s primary display system).

**DMES 3.5.1** M Performance of new display systems is tested to verify performance according to DICOM Grayscale Standard Display Function (GSDF) and recalibrated if necessary.

**DMES 3.5.2** M Performance of display systems is tested to verify performance on an ongoing basis according to DICOM Grayscale Standard Display Function (GSDF) and recalibrated if necessary. See also Mammography Accreditation Standards, MAES 1.2.

**DMES 3.5.3** M Using the TG18-QC test pattern and emulating the images produced by each model of FFDM unit in the facility, (e.g. having the same x-y dimensions, number of bits, and a DICOM header containing appropriate values of all relevant tags) or which might be interpreted at that workstation be displayed at least monthly or more frequently as recommended by the manufacturer and examined on all mammography primary display workstations (e.g. radiologist’s mammography reporting workstation).  

**DMES 3.5.4** M There is regularly scheduled inspection and cleaning (as necessary) of display workstations.
<table>
<thead>
<tr>
<th>DMES 3.6</th>
<th>Quality Control procedures are established and used to monitor performance of the acquisition and technologist review workstations (electronic display devices).</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMES3.6.1</td>
<td>M [ ] Monthly testing is performed using TG18-QC test pattern for acquisition and technologist review display workstations.</td>
</tr>
<tr>
<td>DMES3.6.2</td>
<td>M [ ] DICOM GSDF calibration is performed on an ongoing basis according to manufacturer’s recommendations or established best practices for tech/review workstations used for clinical decisions (e.g. secondary displays).&lt;br&gt;&lt;br&gt;<strong>Intent:</strong> This also includes the acquisition workstation(s). Contrast response of a display does not deviate from the DICOM GSDF contrast values by more than 10%.</td>
</tr>
<tr>
<td>DMES3.6.3</td>
<td>[ ] There is regularly scheduled inspection and cleaning (as necessary) of display workstations.</td>
</tr>
</tbody>
</table>
GLOSSARY

Refer to the Imaging Informatics Accreditation Standards for additional terminology applicable to medical imaging devices, electronic display devices, PACS and Information Systems.

(AAPM TG18) – The American Association of Physicists in Medicine

The American Association of Physicists in Medicine (AAPM) Task Group 18 is a national task force consisting of medical imaging experts and organizational affiliates dealing with performance evaluation of electronic display devices.

Computer Aided Detection (CAD)

Computer Aided Detection Structured Report (CAD SR) – Computer-aided detection structured report containing information regarding the evaluation of the mammogram by a computer and the locations of potential lesions identified by the algorithms.

Grayscale Standard Display Function (GSDF) – A DICOM supplement (part 14) describing how devices can be calibrated to a response that provides a consistent grayscale appearance, independent of the display medium.

Food and Drug Administration (FDA)


DICOM “for processing” – Is the image that has detector blemishes and gain variations reduced by “flat-fielding” process, but no other linear or non-linear image processing applied; this is often known as a “raw” image.

DICOM “for presentation” – Is the contrast and spatial resolution enhanced image, most often using non-linear post-processing methods applied to the “for processing” image, so that a “generic” workstation can present the image data ready for presentation with minimal user adjustments.

Full Field Digital Mammography (FFDM)

(HC)-Health Canada – In Canada, enforces the rules and requirements the government of Canada requires for the sale and importation of medical devices in Canada.
IHE Mammography Image Profile (MAMMO) – The IHE Mammography Image Profile as applied to the digital mammography modality ensures that the acquired digital mammography images contain all relevant information that is necessary for further image processing, application of CAD, storage, review and printing. This profile is absolutely necessary for generating correct digital mammography image content and to ensure optimal presentation of images at the mammography display workstation. Requesting support for the MAMMO profile by the digital mammography modality will provide the following benefits:

- **Reduce Errors and Enhance Patient Care**
  - Ensuring proper, consistent creation of patient and technical information
  - Ensures the acquired images contain the necessary data for identifying patient and technology, and that further image processing and review is correct and meaningful, mainly by:
    - Scaling of the image so that images from the same patient, acquired on different detectors can be displayed at the same size or printed in true size
    - Storing contrast information at the modality so that contrast adjustments do not degrade the quality of displayed images
    - Clear definition of breast tissue and background air so that if contrast adjustments are made during interpretation of the images, the background blackness will be maintained for optimal viewing of the structure of the breast

- **Improve Image Quality**
  - Improves image display and printing by including relevant data in images
  - Ensures that all technique acquisition parameters are available for review
  - Ensures that images can be orientated, justified and sized correctly for proper and expeditious interpretation
  - Ensures that presentation images can be used in a consistent manner on different review workstations

**Megapixel (MP)** – One million pixels, this term is often used to describe LCD and CRT electronic display systems (monitors) based upon the number of pixels that can be individually mapped to the display surface.

**“True” size** – The display of an image such that an object in the image when measured with a hand-held ruler on the surface of the display measures as closely as possible to the true physical size of the object if located on the front face of the detector housing (from IHE information).

**Matrix** – An image formed by distinct points in both the horizontal and vertical directions. For example, a 512 matrix is made up of 512 points in one axis and 512 points in another.

**Matrix size:**

- **Small matrix size** – Defined as images from CT, MRI, ultrasound, echocardiography and nuclear medicine.

- **Large matrix size** – Defined as images from computed radiography, digital radiography and digitized radiographic film.

- **Extra large matrix size** – Defined as images from mammography.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.

SPECIFIC DOCUMENTS REFERENCED


2. American College of Radiology Practice Guideline for the Performance of Screening and Digital Mammography, 2008 Res.24*, p.4


10. IHE changing the way healthcare connects. Retrievable from www.ihe.net
11 Assessment of Display Performance For Medical Imaging Systems, AAPM On-line Report No. 03, 2005
Retrievable from: http://www.aapm.org/pubs/reports/OR_03.pdf

12 ACR Practice Guidelines for Determinants of Image Quality in Digital Mammography, 2007(Res.35)
10/01/07, p.7,8. Retrievable from:
http://www.acr.org/SecondaryMainMenuCategories/quality_safety/guidelines/breast/image_quality
_digital_mammo.aspx

13 ACR Practice Guidelines for Determinants of Image Quality in Digital Mammography, 2007(Res.35)
p.9. 10/01/07 as available on:
http://www.acr.org/SecondaryMainMenuCategories/quality_safety/guideline/breast/image_quality_
digital_mammo.aspx

14 ACR Practice Guidelines for Determinants of Image Quality in Digital Mammography, 2007(Res.35)
Page 8. 10/01/07 as available on:
http://www.acr.org/SecondaryMainMenuCategories/quality_safety/guidelines/breast/image_quality_
digital_mammo.aspx.

15 Assessment of Display Performance For Medical Imaging Systems, AAPM On-line Report No. 03, 2005
Table 3, p. 64 Retrievable from: http://www.aapm.org/pubs/reports/OR_03.pdf

16 ACR Practice Guidelines for Determinants of Image Quality in Digital Mammography, 2007(Res.35)
Page 17 10/01/07 Retrievable from:
http://www.acr.org/SecondaryMainMenuCategories/quality_safety/guidelines/breast/image_quality_
digital_mammo.aspx

17 ACR Practice Guidelines for Determinants of Image Quality in Digital Mammography, 2007(Res.35)
10/01/07 Page 13 Retrievable from:
http://www.acr.org/SecondaryMainMenuCategories/quality_safety/guidelines/breast/image_quality
digital_mammo.aspx

18 Quality control for digital mammography: Part II recommendations from the ACRIN DMIST trial.
Retrievable from: http://bric.unc.edu/breastimaging/breastlab/yaffe.pdf
ACCREDITATION STANDARDS 2010

ULTRASOUND

The Ultrasound Accreditation Standards are used in conjunction with the Global Modality Accreditation Standards.

Introduction:
In addition to the Global Modality Accreditation Standards, the modality specific Accreditation Standards for Ultrasound provide additional mandatory requirements and best practices for accreditation in the modality of Ultrasound.

The Ultrasound section of the Accreditation Standards address additional requirements related to:
- Imaging procedures
- Interpretation and reports
- Equipment

IMAGING PROCEDURES

US  3.0  Standard protocols result in images appropriate for their intended use in clinical decision-making.

US  3.1  There is a comprehensive process in place for protocol adoption and development.
See also Global Modality Accreditation Standards GM 3.1.

US3.1.1 M  Protocols are reviewed every 1–3 years by qualified individual(s).

US  3.2  Protocols contain all the information necessary to perform the examination.

US3.2.1 M  clearly specified measurements and imaging views.
### ACCREDITATION STANDARDS

**ULTRASOUND**

<table>
<thead>
<tr>
<th>US 3.3</th>
<th>Examinations are performed following established protocols.</th>
</tr>
</thead>
<tbody>
<tr>
<td>US3.3.1</td>
<td>M □ Protocols are readily available to staff performing the examination.</td>
</tr>
</tbody>
</table>
| US3.3.2 | M □ Probes are cleaned and disinfected between patients.  
  Intent: Probes that only contact intact skin require cleaning and low level disinfection.¹ The activities associated with reprocessing endocavity probes are addressed in the Infection Prevention and Control Accreditation Standards DIPC6.2.3 and DIPC 7.0. |
| US3.3.3 | M □ Probes are covered, whenever appropriate.  
  Intent: Probes are covered during sterile interventional procedures and for cases with a risk of infection. |
| US3.3.4 | M □ Any endocavity probe, when in use, is protected by a single-use disposable cover or a commercially available probe cover. |
| US3.3.5 | M □ If there is evidence of contamination, probe cleaning/disinfection is performed according to endocavity reprocessing requirements (high level disinfection). |
| US3.3.6 | M □ There is an established protocol for the use of gel in the performance of the ultrasound examinations that is in accordance with Health Canada Safety Guidelines.² |
| US3.3.7 | □ Sonographers are aware of the As Low as Reasonably Achievable (ALARA) principle. |

<table>
<thead>
<tr>
<th>US 3.4</th>
<th>Mechanisms are in place to ensure the timely review and consultation of examinations by the imaging physician.</th>
</tr>
</thead>
<tbody>
<tr>
<td>US3.4.1</td>
<td>M □ There is audio communication.</td>
</tr>
<tr>
<td>US3.4.2</td>
<td>M □ Examinations are available for immediate review.</td>
</tr>
<tr>
<td>US3.4.3</td>
<td>M □ If the sonograms are reviewed with a physician; the name of the physician is recorded.</td>
</tr>
</tbody>
</table>

**INTERPRETATION AND REPORTS**

<table>
<thead>
<tr>
<th>US 8.0</th>
<th>Diagnostic reports are in a standardized format that provides comprehensive and necessary information for clinical decision-making.</th>
</tr>
</thead>
</table>
| US 8.2 | Reports contain sufficient information to assist in diagnosis.  
  See also Global Modality Accreditation Standards GM 8.2.  
  The body of the report includes the following: |
| US8.2.1 | M □ findings.  
  Guidance: Standardized measurements and any structures not well visualized are noted. |
ACCREDITATION STANDARDS
ULTRASOUND

EQUIPMENT

USES 1.0 Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

USES 1.1 Equipment specifications ensure diagnostic quality and include the following:

USES1.1.1 real-time, 2D grey-scale imaging.
USES1.1.2 M-mode imaging.
USES1.1.3 color, pulsed, and/or power Doppler.
USES1.1.4 harmonic imaging.
USES1.1.5 a range of transducer frequencies appropriate for the patient population.
USES1.1.6 for prostate or rectal imaging, an endocavity transducer is available.
USES1.1.7 for early obstetric and gynecologic imaging, an endovaginal transducer is available with a frequency of ≥7MHz.
USES1.1.8 for small parts imaging, a transducer with a frequency of ≥7.5 MHz is available.

USES 2.0 Equipment testing is performed prior to clinical use.

USES 2.1 Acceptance testing is performed after purchase and prior to clinical use of equipment that includes:

USES2.1.1 visual inspection of system and probes.
USES2.1.2 electrical leakage current testing of probes.
USES2.1.3 probe elements/cable/delamination testing being performed at a minimum at time of preventive maintenance.

Intent: Research studies have shown that transducer arrays with dead elements can result in increased image noise and inaccurate Doppler flow velocity measurements. Qualitative system tests using tissue-mimicking phantoms may not fully reveal the extent of transducer and cable defects and system self-tests performed by the ultrasound machine do not test the transducer or cable performance. Quantitative assessment of the transducer’s lens, matching layer, acoustic array, cable and connector can be performed using a commercially available computerized test device that measures element sensitivity (volts p-p), capacitance (pF), pulse width (ns), center frequency (MHz), and fractional bandwidth (%). The device is used to acceptance test new or recently repaired transducers and also aids in transducer repair or replacement decision making by differentiating between system problems and transducer problems. Identifying transducer defects early helps ensure clinical image quality is optimized and may significantly reduce repair costs.4,5,6

3

4

5

6
USES 3.0 Quality Assurance programs are established to ensure the attainment of intended quality.
See also Equipment and Supplies Accreditation Standards DES3.0.

USES 3.1 Quality Control procedures are established and used to monitor performance of ultrasound systems that includes:

USES3.1.1 M ☐ visual inspection of system and probes.
USES3.1.2 M ☐ electrical leakage current testing being performed after probe repair and at a minimum at time of preventive maintenance.
USES3.1.3 ☐ probe elements/cable/delamination testing being performed at a minimum at time of preventive maintenance.
USES3.1.4 ☐ image uniformity, visualization depth and distance accuracy being checked at a minimum at time of preventive maintenance.
USES3.1.5 ☐ annual tests of lateral and axial resolution and dead zone.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.

The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.

SPECIFIC DOCUMENTS REFERENCED


ACCREDITATION STANDARDS 2010

ECHOCARDIOGRAPHY

The Echocardiography Accreditation Standards are used in conjunction with the Global Modality Accreditation Standards.

Introduction:
In addition to the Global Modality Accreditation Standards, the modality specific Accreditation Standards for Echocardiography provide additional mandatory requirements and best practices for accreditation in the modality of Echocardiography.

The Echocardiography section of the Accreditation Standards address additional requirements related to:
- Imaging procedures
- Interpretation and reports
- Equipment
- Appropriate physical environment

In the context of these Accreditation Standards the term echocardiographer refers to a physician credentialed by the Diagnostic Accreditation Program of B.C. to perform echocardiography diagnostic services.

IMAGING PROCEDURES

EC 3.0 Standard protocols result in echocardiograms appropriate for their intended use in clinical decision-making.

EC 3.1 There is a comprehensive process in place for protocol adoption and development. See also Global Modality Accreditation Standards GM 3.1.

EC3.1.1 M □ Protocols are reviewed every 1-3 years by qualified individual(s).

EC 3.2 Protocols contain all the information necessary to perform the examination. Protocol information includes, but is not limited to:

EC3.2.1 M □ clearly specified measurements and imaging views.

Enhancing public safety through excellence in diagnostic medicine accreditation
EC 3.3  Examinations are performed following established protocols.

EC3.3.1  M  Protocols are readily available to staff performing the examination.

EC3.3.2  M  Probes are cleaned and disinfected between patients.

Intent: Probes that only contact intact skin require cleaning and low level disinfection. The activities associated with reprocessing endocavity probes are addressed in the Infection Prevention and Control Accreditation Standards. See DIPC 6.2.3 and DIPC 7.0.

EC3.3.3  M  TTE probes are covered, whenever appropriate.

Intent: Probes are covered during sterile interventional procedures and for cases with a risk of infection.

EC3.3.4  M  If there is evidence of contamination, probe cleaning/disinfection is performed according to TEE reprocessing requirements (high level disinfection).

EC3.3.5  M  There is an established protocol for the use of gel in the performance of the echocardiography examinations that is in accordance with Health Canada Safety Guidelines.

EC3.3.6  □  Cardiac sonographers are aware of the As Low As Reasonably Achievable (ALARA) principle.

EC3.3.7  □  There are protocols for the pediatric population.

EC 3.4  Mechanisms are in place to ensure the timely review and consultation of examinations by the imaging physician.

Guidance: See also the Human Resources Accreditation Standards, DHR 6.1

EC3.4.1  M  There is audio communication.

EC3.4.2  M  Examinations are available for immediate review

EC3.4.3  M  If the echocardiograms are reviewed with a physician; the name of the physician is recorded.

INTERPRETATION AND REPORTS

EC 8.0  Diagnostic reports are in a standardized format that provides comprehensive and necessary information for clinical decision-making.

EC 8.2  Reports contain sufficient information to assist in diagnosis.

See also Global Modality Accreditation Standards GM 8.2.

The body of the report includes the following:

EC8.2.1  M  findings.

Guidance: Standardized measurements and any structures not well visualized are noted.
ACCREDITATION STANDARDS
ECHOCARDIOGRAPHY

EQUIPMENT

ECES 1.0 Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

ECES 1.1 Equipment specifications ensure diagnostic quality and include the following:

- real-time, 2D grey-scale imaging.
- M-mode imaging.
- color, pulsed, tissue, power and continuous wave Doppler.
- harmonic imaging.
- a range of transducer frequencies appropriate for the patient population.
- pediatric TEE transducers are small enough to be used in a safe and prudent manner in infants and children appropriate for their body weight.
- dedicated CW Doppler probe.
- ECG display capability.
- multi-planar probes for TEE.

ECES 2.0 Equipment testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES 2.1.

ECES 2.1 Acceptance testing is performed after purchase and prior to clinical use of equipment that includes:

- visual inspection of system and probes.
- electrical leakage current testing of probes.
- probe elements/cable/delamination testing being performed at a minimum at time of preventive maintenance.

Intent: Research studies have shown that transducer arrays with dead elements can result in increased image noise and inaccurate Doppler flow velocity measurements. Qualitative system tests using tissue-mimicking phantoms may not fully reveal the extent of transducer and cable defects and system self-tests performed by the ultrasound machine do not test the transducer or cable performance. Quantitative assessment of the transducer’s lens, matching layer, acoustic array, cable and connector can be performed using a commercially available computerized test device that measures element sensitivity (volts p-p), capacitance (pF), pulse width (ns), center frequency (MHz), and fractional bandwidth (%). The device is used to acceptance test new or recently repaired transducers and also aids in transducer repair or replacement decision making by differentiating between system problems and transducer problems. Identifying transducer defects early helps ensure clinical image quality is optimized and may significantly reduce repair costs.
ECES 3.0  Quality Assurance programs are established to ensure the attainment of intended quality.
See also Equipment and Supplies Accreditation Standards DES 3.0.

ECES 3.1  Quality Control procedures are established and used to monitor performance of echocardiography systems that includes:

ECES3.1.1 M  electrical leakage current testing is performed on TEE probes before each patient use.
ECES3.1.2 M  visual inspection of system and probes.
ECES3.1.3 M  electrical leakage current testing is performed at acceptance testing, after probe repair and at a minimum at time of preventive maintenance.
ECES3.1.4 M  probe elements/cable/delamination testing being performed at a minimum at time of preventive maintenance.
ECES3.1.5 M  image uniformity, visualization depth and distance accuracy being checked at a minimum at time of preventive maintenance.
ECES3.1.6 M  annual tests of lateral and axial resolution and dead zone.

APPROPRIATE PHYSICAL ENVIRONMENT

EC 11.0  The design and layout of the echocardiography service’s physical space allows service delivery to be safe, and efficient for patients and staff.

EC 11.1  Transesophageal echocardiography is performed in an environment designed to ensure patient safety.

EC11.1.1 M  Appropriately qualified supplementary staff (e.g. nurses with critical care nursing experience) is present and actively participates in the tasks of medication infusion, patient monitoring and patient recovery.
Guidance: In addition to the performing physician, qualified staff is available before, during and after the examination.

EC11.1.2 M  The room is large enough to accommodate emergency management monitoring equipment.

EC11.1.3 M  There is an emergency crash cart immediately accessible. In this context “immediately accessible” refers to the cart reaching the patient within thirty (30) seconds.

EC11.1.4 M  An emergency drug tray is available in the room.

The contents of the emergency drug tray include, but are not limited to:

EC11.1.5 M  nitroglycerine, in tablet or aerosol spray
EC11.1.6 M  epinephrine
EC11.1.7 M  atropine
EC11.1.8 M  intravenous supplies
EC11.1.9 M  parenteral antihistamine
EC11.1.10 M  parenteral antiemetic
EC11.1.11 M □ short-acting bronchodilator (e.g. salbutamol) either in a metered-dose inhaler with a spacer device or as a solution with a nebulizer administration unit, ventolin nebules or as a discus device.

EC 11.2 Stress echocardiography is performed in a safe environment and according to established protocols.

EC11.2.1 M □ An authorized physician is responsible for direct supervision to treat any potential reactions or complications that may arise.

Guidance: Direct supervision means that the physician be present and immediately available to provide assistance and direction throughout the performance of the procedures. It does not mean that the physician be present in the room where the procedure is performed. Ultimately the medical leader is responsible for determining the authorized physician.

EC11.2.2 M □ Appropriately qualified supplementary staff is present and actively participate in patient safety tasks.

The tasks include:

EC11.2.3 M □ treadmill operation.
EC11.2.4 M □ Electrocardiogram (ECG) monitoring.
EC11.2.5 M □ medication infusion and patient monitoring.
EC11.2.6 M □ There is an emergency crash cart immediately accessible.
EC11.2.7 M □ An emergency drug tray is available in the room.

The contents of the emergency drug tray include, but are not limited to:

EC11.2.8 M □ nitroglycerine, in tablet or aerosol spray
EC11.2.9 M □ epinephrine
EC11.2.10 M □ atropine
EC11.2.11 M □ intravenous supplies
EC11.2.12 M □ parenteral antihistamine
EC11.2.13 M □ parenteral antiemetic.
EC11.2.14 M □ short-acting bronchodilator (e.g. salbutamol) either in a metered-dose inhaler with a spacer device or as a solution with a nebulizer administration unit, ventolin nebules or as a discus device.

EC11.2.15 □ There is adequate space to facilitate the treadmill and imaging equipment.
EC11.2.16 □ Stress testing protocols include a description of graded protocols (e.g. speed, incline and workload, if applicable) and/or infusion details.

The protocols include, but are not limited to:

EC11.2.17 □ timing of assessing symptoms, heart rate, blood pressure and ECG tracings (using 12-lead).

Intent: The protocols include instructions for the time of measurement of symptoms, heart rate, blood pressure and electrocardiographic findings.
EC11.2.18 □ exercise/testing end points.
EC11.2.19 □ post-stress monitoring.
EC11.2.20 □ identification and treatment of common adverse events (e.g. hypertension, dyspnea, chest pain).
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.

SPECIFIC DOCUMENTS REFERENCED


ACCREDITATION STANDARDS 2010

COMPUTED TOMOGRAPHY

The Computed Tomography Accreditation Standards are used in conjunction with the Global Modality Accreditation Standards.

Introduction:
In addition to the Global Modality Accreditation Standards, the modality specific Accreditation Standards for Computed Tomography provide additional mandatory requirements and best practices for accreditation in the modality of Computed Tomography.

The Computed Tomography section of the Accreditation Standards address additional requirements related to:
- Examination requests
- Imaging procedures
- Medical records
- Equipment

EXAMINATION REQUEST

CT 1.0 Examination requests are standardized and ensure that accurate, comprehensive and appropriate information is relayed.

CT 1.1 Processing of the examination requests ensures:
See also Global Modality Accreditation Standards GM 1.1.

CT1.1.1 M □ there is a review by a radiologist for appropriateness, priority and protocol assignment prior to booking examination.

CT1.1.2 M □ there is a policy that defines those requests that do not need to be reviewed by the radiologist prior to booking the examination.

CT 1.2 Examination requests contain accurate information that is received prior to an examination being undertaken.
See also Global Modality Accreditation Standards GM1.2.

CT1.2.1 M □ Outpatient requisitions for intravascular contrast agent examinations indicate recent eGFR.

Guidance: For inpatients, either the requisition or information system indicates the recent eGFR results. See also Global Modality Accreditation Standards GM 4.4.
IMAGING PROCEDURES

Definition:
The term Dose-Length Product (DLP) is a measurable dose indicator of radiation exposure for a complete CT examination. The effective dose or the organ dose delivered to a patient in a CT examination can be estimated and also used to establish diagnostic reference levels.

CT  3.0 Standard protocols result in images appropriate for their intended use in clinical decision-making.

CT  3.1 There is a comprehensive process in place for protocol adoption and development.
See also Global Modality Accreditation Standards GM 3.1.
CT3.1.1 M Protocols are reviewed at least annually and revised as necessary by qualified individual(s).

CT  3.2 Protocols contain all the information necessary to perform the examination.
Protocol information includes, but is not limited to:
CT3.2.1 M the equipment/supplies needed.
CT3.2.2 M a description of patient positioning.
CT3.2.3 M the technical parameters used.
CT3.2.4 M the type and dose of contrast agents administered.
CT3.2.5 when review by the imaging physician is required before patient discharge.
Note: There is always the provision for the imaging protocol to require prompt radiologist review of the images before patient discharge (e.g. where it is unclear from the initial request whether additional series, or contrast administration will be required).

CT  3.3 Examinations are performed following established protocols.
CT3.3.1 M Protocols are readily available to staff performing the examination.
CT3.3.2 M Protocols are equipment specific, where appropriate.
CT3.3.3 M Protocols are preprogrammed in the scanner with lowest clinically acceptable patient dose.
CT3.3.4 M There are protocols for the pediatric population.
Intent: CT examinations of infants and children are only performed using techniques and loading factors which have been modified for size and age.¹

CT  3.4 Images are reviewed for diagnostic quality before the patient is released.
Image review ensures the:
CT3.4.1 M anatomic area of interest is well positioned.
CT3.4.2 M presence of artifacts and motion does not impact the diagnostic image quality.
CT3.4.3 M appropriate window levels.
CT 3.4

CT 3.4.4
M □ use of the appropriate Field of View (FOV).

CT 3.4.5
M □ adequate contrast enhancement of the structures in question.

CT 3.4.6
M □ appropriate use of the algorithm for the structures to be highlighted.

CT 3.4.7
M □ use of appropriate reformats for the structures to be optimally demonstrated.

CT 3.4.8
M □ use of 3D reconstruction, wherever appropriate.

CT 3.5

Patient safety is monitored before, during and after a CT examination.

CT 3.5.1
M □ When performed, CT fluoroscopy is under the direction and supervision of a radiologist.

CT 3.5.2
M □ There is appropriate operating console ergonomics so when the technologist is seated at the imaging console they have a direct view of the patient. If this is not the case, then a television/monitor is installed to provide this view of the patient.

CT 3.5.3
M □ Staff is aware of the table weight limit.

CT 3.5.4
M □ The decisions to scan patients who exceed the table weight limit are considered on a case-by-case basis.

MEDICAL RECORD

CT 7.0
The medical record is current, accurate and contains relevant examination details.

CT 7.1
Images are labeled in a standardized way that allows for proper patient identification and annotation that includes:
See also Global Modality Accreditation Standards GM 7.1.

CT 7.1.1
M □ slice location that includes the appropriate marking for anatomic orientation and position.

CT 7.1.2
□ cross-reference image with the corresponding location of slices displayed.

CT 7.2
Comprehensive examination details are recorded in the medical record that includes:
See also Global Modality Accreditation Standards GM 7.2.

CT 7.2.1
M □ pregnancy status.

CT 7.2.2
M □ date of Last Menstrual Period (LMP) for examinations involving any radiation to the abdomen or pelvis on women of childbearing age.

CT 7.2.3
M □ for CT fluoroscopy devices, fluoroscopy time is recorded.

CT 7.2.4
M □ an indicator of radiation dose, DLP.
Guidance: Any unusually high values/variances are investigated by a medical physicist as necessary.

CT 7.2.5
M □ patient dose information such as the DLP value is appended to the examination as a separate series.
EQUIPMENT

CTES 2.0 Equipment testing is performed prior to clinical use.

Note: See also the following standards: Radiation Safety Accreditation Standards RS 5.1 and RS 5.2., radiation protection surveys and RS 4.1.1 for Radiation Emitting Devices (RED) regulations. As part of acceptance testing procedures there is verification of compliance to RED regulations for diagnostic X-ray equipment, Part XII (RS 4.1.1).

See also Equipment and Supplies Accreditation Standards DES2.1.

CTES 2.1 Acceptance testing is performed after purchase and prior to clinical use of the equipment.

During acceptance testing there is a process for:

CTES2.1.1 M initial inspection and inventory.
CTES2.1.2 M inspection of documentation.

Acceptance testing includes visual and functional testing of the:

CTES2.1.3 M mechanical properties.
CTES2.1.4 M safety systems.

Testing includes evaluation of the:

CTES2.1.5 M accuracy of loading factors.

Intent: Health Canada Safety Code 35 has not required testing of the KVP accuracy and current time product however; this must be assessed at acceptance testing and is also strongly recommended to be assessed annually.

CTES3.1.6 M CT number accuracy.
CTES3.1.7 M CT noise.
CTES3.1.8 M CT uniformity.
CTES3.1.9 M CT number calibration.
CTES3.1.10 M CT number linearity.
CTES3.1.11 M CT tomographic section thickness.
CTES3.1.12 M CT patient support movement.
CTES3.1.13 M CT laser light accuracy.
CTES3.1.14 M CT accuracy of automatic positioning of tomographic plane.
CTES3.1.15 M CT accuracy of gantry tilt.
CTES3.1.16 M CT spatial resolution.
CTES3.1.17 M CT low contrast detectability.
CTES3.1.18 M CT number dependence on phantom position.
CTES3.1.19 M CT radiation dose profile.
CTES3.1.20 M CT radiation dose.
CTES3.1.21 M CT patient dose.
CTES 3.0  Quality Assurance programs are established to ensure the attainment of intended quality.\(^2\)

See also Equipment and Supplies Accreditation Standards DES 3.0.

CTES 3.1  Daily Quality Control procedures are established and used to monitor performance that includes:

- **CTES3.1.1** M  performing manufacturer’s recommended equipment warm-up.
  
  *Guidance:* This includes air calibration.

- **CTES3.1.2** M  assessment of meters operation.
  
  *Guidance:* Meters and visual and audible indicators are checked for proper operation.

- **CTES3.1.3** M  assessment of equipment conditions.
  
  *Guidance:* X-ray equipment conditions are visually inspected for loose or broke components and cleanliness. The X-ray source assembly is checked for motion or vibration during operation. Visual inspection is conducted on all other components of the imaging systems.

CTES 3.2  Weekly Quality Control procedures are established and used to monitor performance. Testing includes:

- **CTES3.2.1** M  visual Inspection of the cleanliness of imaging systems.
  
  *Guidance:* The annular X-ray beam window is inspected for dust and dirt and is cleaned with a moist cloth.

  Testing includes evaluation of the:

- **CTES3.2.2** M  CT number accuracy.
  
  *Guidance:* Done to check CT number water 0 ± 4 Hounsfield Units (HU) Using a uniform water phantom, the mean CT number of water and the standard deviation, within a large region of interest, remains within the established baseline and acceptable limits of variation.

- **CTES3.2.3** M  CT noise.
  
  *Guidance:* Noise does not vary by more than 0.2 HU from the baseline tests at acceptance. Noise is given by a variation of CT numbers from a mean value in a defined area in the image of a uniform phantom.

- **CTES3.2.4** M  CT uniformity.
  
  *Guidance:* Uniformity is defined as the consistency of the CT numbers of an image of a homogeneous material across the scan field. Uniformity is calculated using an equation which is the difference in the mean CT number in the centre of the phantom image from that of the periphery of the phantom image. Uniformity does not exceed 2 HU from the baseline measured at acceptance testing.
Accreditation Standards 2010
Diagnostic Imaging

CTES 3.3 Monthly Quality Control procedures are established and used to monitor performance.
Testing includes evaluation of the:

CTES3.3.1 □ CT tomographic section thickness.
CTES3.3.2 □ CT number calibration.
CTES3.3.3 □ CT number linearity.

Guidance: Check CT number over CT range -1000 to +1000

CTES 3.4 Quarterly Quality Control procedures are established and used to monitor performance.
Testing includes an:

CTES3.4.1 □ assessment of interlocks.

Guidance: Interlocks are uncommon. If there are interlocks on the door(s), they are to be tested to ensure that they prevent the X-ray equipment from producing radiation when the door is open.

Testing includes evaluation of the:

CTES3.4.2 □ accuracy of CT patient support movement.

Intent: The accuracy of the patient support movement ensures that the desired volume of the patient is scanned. This becomes important when performing contiguous scans where the scan interval equals the scan width to image an entire volume of the patient. The measured patient support movement is to be within ±1mm of the intended movement when the patient support moves both into and out of the gantry.

CTES3.4.3 □ CT spatial resolution

Guidance: Measure Modulation Transfer Function (MTF) or line pair phantom.

CTES3.4.4 □ CT low contrast detectability.

Guidance: Low contrast detectability is typically specified as the smallest sized object at a specified contrast level to the background which can be seen in a particular phantom when imaged under specified conditions. This is a subjective test as it will depend on a number of factors including the visual acuity of the observers and ambient lighting conditions.
ACCREDITATION STANDARDS
COMPUTED TOMOGRAPHY

CTES  3.5  **Semi-Annual** Quality Control procedures are established and used to monitor performance. Testing includes an assessment of:

**CTES3.5.1** M ☐ CT laser light accuracy.

**CTES3.5.2** M ☐ CT accuracy of automatic positioning of tomographic plane (using the scanned projection radiograph).

*Guidance: Check localization scan corresponds to digital display ± 2mm.*

**CTES3.5.3** M ☐ CT patient dose.

*Guidance: Check Computed Tomography Dose Index (CTDI) ± 20% from baseline values*

**CTES3.5.4** ☐ CT accuracy of gantry tilt.

CTES  3.6  **Annual** Quality Control procedures are established and used to monitor performance. Testing includes an assessment of:

**CTES3.6.1** M ☐ CT number dependence on phantom position.

*Guidance: Check CT number water 0 ± 5 HU for possible patient positions in the gantry.*

**CTES3.6.2** M ☐ CT radiation dose.

*Guidance: The dose delivered from a scout localization image, which is a scanned projection radiograph, is to remain within ± 20% of the nominal value. Changes in this dose can be indicative of problems with collimation or patient support movement. The technique and loading factors used to obtain the scout localization image is to be recorded, so that identical test conditions can be used for subsequent tests. It is recommended that this test be performed semi-annually, but is performed at least annually.*

**CTES3.6.3** ☐ CT radiation dose profile.

*Guidance: The collimation of the radiation beam is assessed to ensure it does not exceed the prescribed scan width.*
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.

The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.

John E. Aldrich, Ana-Maria Bilawich, John R. Mayo, Radiation Doses to Patients Receiving Computed Tomography Examinations in British Columbia. CAR: Vol 57, No 2, April 2006

SPECIFIC DOCUMENTS REFERENCED


ACCREDITATION STANDARDS 2010

MAGNETIC RESONANCE IMAGING

The Magnetic Resonance Imaging Accreditation Standards are used in conjunction with the Global Modality Accreditation Standards.

Introduction:
In addition to the Global Modality Accreditation Standards, the modality specific Accreditation Standards for Magnetic Resonance Imaging provide additional mandatory requirements and best practices for accreditation in the modality of Magnetic Resonance Imaging.

The Magnetic Resonance Imaging section of the Accreditation Standards address additional requirements related to:
- Examination requests
- Imaging procedures
- Medical records
- Equipment

EXAMINATION REQUEST

MR 1.0 Examination requests are standardized and ensure that accurate, comprehensive and appropriate information is relayed.

MR 1.1 Processing of the examination requests ensures:
See also Global Modality Accreditation Standards GM 1.1.

MR1.1.1 M □ there is a review by a radiologist for appropriateness, priority and protocol assignment prior to booking examination.

MR1.1.2 M □ there is a facility policy that defines those requests that do not need to be reviewed by the radiologist.
ACCREDITATION STANDARDS
MAGNETIC RESONANCE IMAGING

MR 1.2 Examination requests contain accurate information that is received prior to an examination being undertaken.

See also Global Modality Accreditation Standards GM 1.2.

MR1.2.1 Outpatient requisitions for IV contrast enhanced examinations indicate significant renal disease or risk factors.

Guidance: For inpatients, information on renal disease or risk factors is available in the medical record. See also Global Modality Accreditation Standards GM 4.5.

IMAGING PROCEDURES

MR 3.0 Standard protocols result in images appropriate for their intended use in clinical decision-making.

MR 3.1 There is a comprehensive process in place for protocol adoption and development.

See also Global Modality Accreditation Standards GM 3.1.

MR3.1.1 M Protocols are reviewed every 1-3 years by qualified individual(s).

MR 3.2 Protocols contain all the information necessary to perform the examination.

Protocol information includes, but is not limited to:

MR3.2.1 M the equipment/supplies needed.

MR3.2.2 M a description of patient positioning.

MR3.2.3 M the technical parameters used.

MR3.2.4 M the type and dose of contrast agents administered.

Intent: Gadolinium-containing contrast media selection should consider the relationship in respect to risk of nephrogenic systemic fibrosis. See also Global Modality Accreditation Standard GM 4.5.5.

MR3.2.5 M when guidance and/or review by a radiologist are required prior to patient discharge (e.g. suspected cord compression, cases involving moderate sedation or general anesthesia, etc.).

Intent: There is always the provision for the imaging protocol to require prompt MRI radiologist review of the images before patient discharge (e.g. where it is unclear from the initial request whether additional pulse sequences, or contrast administration will be required).

MR 3.3 Examinations are performed following established protocols.

MR3.3.1 M Protocols are readily available to staff performing the examination.

MR3.3.2 M Source images from which 3D processing were performed are archived.

MR3.3.3 M Protocols are equipment specific, where appropriate.
Images are reviewed for diagnostic quality before the patient is released.

MR 3.4.1 M The anatomic area of interest is well positioned using the appropriate imaging planes and post-processing techniques are used, where appropriate.

MR 3.4.2 M The presence of artifacts and motion does not impact the diagnostic image quality.

MR 3.4.3 M The use of appropriate pulse sequences and associated imaging parameters including motion and molecular suppression options and averages that produce the maximum Signal to Noise Ratio (SNR) and optimal resolution in the shortest scan time possible.

MR 3.4.4 M The use of appropriate coils and techniques for optimal SNR as well as spatial and/or temporal resolution of the area imaged.

MEDICAL RECORD

MR 7.0 The medical record is current, accurate and contains relevant examination details.

MR 7.1 Images are labeled in a standardized way that allows for proper patient identification and annotation that includes:

See also Global Modality Accreditation Standards GM 7.1.

MR 7.1.1 M slice location that includes the appropriate marking for anatomic orientation and position.

MR 7.1.2 M cross-reference image with the corresponding location of slices displayed.

Intent: Cross-reference and displayed transverse images can be valuable for spine imaging interpretation (also labeling of vertebrae as reference). The facility may also define other protocols that should include capture of cross-referenced images.

MR 7.2 Comprehensive examination details are recorded in the medical record that includes:

See also Global Modality Accreditation Standards GM 7.2.

MR 7.2.1 M pregnancy status.
# ACCREDITATION STANDARDS

## MAGNETIC RESONANCE IMAGING

### EQUIPMENT

**MRES 2.0** Equipment testing is performed prior to clinical use.  
See also Equipment and Supplies Accreditation Standards DES2.1.

**MRES 2.1** Acceptance testing is performed by a medical physicist after purchase and prior to clinical use of the MRI system:  
Guidance: Acceptance testing follows recognized standards such as the American Association of Physicists in Medicine (AAPM) or The National Electrical Manufacturers Association (NEMA). Testing will also include verification of compliance with standards for RF power deposition.

Acceptance testing procedures include, but are not limited to the following:

- **MRES2.1.1** Assessment and identification of the fringe fields (5 gauss line).  
- **MRES2.1.2** Assessment of magnetic field homogeneity.  
- **MRES2.1.3** RF shield integrity.  
- **MRES2.1.4** RF calibration.  
- **MRES2.1.5** System signal to noise ratio.  
- **MRES2.1.6** Signal uniformity.  
- **MRES2.1.7** Assessment of geometrical distortion.  
- **MRES2.1.8** Slice thickness and positioning accuracy or equivalent tests of gradient performance and RF pulse characteristics.

**MRES 3.0** Quality Assurance programs are established to ensure the attainment of intended quality.  
See also Equipment and Supplies Accreditation Standards DES3.0.

**MRES 3.1** Quality Control procedures are established and used to monitor performance.  
- **MRES3.1.1** There is a daily system restart of the scanner.  
- **MRES3.1.2** QC procedures are routinely performed and at a minimum, a weekly phantom scan is performed to record parameters including, but not limited to; the transmitter amplitude, MRI centre frequency, signal to noise, and T2 relaxation time.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.

The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.
MAGNETIC SAFETY

Introduction:
These standards have been adapted from the American College of Radiology, ACR Guidance Document for Safe MR Practices, 2007. These standards pertain to all types of scanners and all field strengths (low to high) approved for clinical practice by Health Canada.

The goal of magnetic safety is to prevent harm to patients. However, a MRI facility cannot simply adopt one or two interventions and hope to successfully attain this objective. According to safety and human factors engineering principles, multiple safety strategies must be adopted to be effective. As an example, policies that restrict access, specialized training and drills for MRI personnel, and warning labels for devices to be brought into Zone IV regions. Proper resources and professional discipline to never assume safety of an object in the MRI suite is crucial. Along with these people-oriented strategies of policies and training, facilities need also to adopt the strategies of safety-oriented architectural and interior design. These design elements can support the other safety strategies by making them easier or more obvious to follow.

The Magnetic Safety section of the Accreditation Standards addresses:

- Facility design and access restrictions
- Safety screening
- Safety education

Definitions:

Magnetic resonance (MR) refers to the resonance phenomenon resulting in the absorption and/or emission of electromagnetic energy by nuclei or electrons in a static magnetic field, after excitation by a suitable Radio Frequency (RF) magnetic field.

Magnetic resonance imaging (MRI) is the use of magnetic resonance to create images of objects such as the body. Currently, this primarily involves imaging the distribution of mobile hydrogen nuclei (protons) in the body. In literature the terms MR and MRI are often used interchangeably however; in the context of these Accreditation Standards the term MRI is used and the term MR is only used when referring to the terminology applied to implants and devices relative to the MRI environment (For example, MR safe, MR conditional, and MR unsafe.).
Magnetic field strengths are measured in units of gauss (G) and Tesla (T). One Tesla is equal to 10,000 gauss. The main magnetic field of a 1.5 T magnet is about 30,000 times the strength of the earth’s magnetic field. The main magnetic field of a 3T system is 60,000 times the earth’s magnetic field. The strength of electromagnets used to pick up cars in junk yards is about the field strength of MRI systems with field strengths from 1.5-2.0T.

Specific Absorption Rate (SAR) is a measure of energy deposited by an RF field in a given mass of tissue. SAR is established by the International Electrotechnical Commission (IEC) and the Food and Drug Administration to not exceed 8 watts per kg (W/kg) of tissue for any 5 minute period or 4 W/kg for a whole body averaged over 15 minutes. Unregulated absorption can lead to injury. The heating potential is notably higher and more significant at higher field strengths than at lower fields. The doubling of the field strength from 1.5T to 3T leads to a quadrupling of the SAR.

FACILITY DESIGN AND ACCESS RESTRICTIONS

Definitions:

Safety regions
The term zone is used to conceptually divide the MRI service into four safety regions. Of critical importance is determining where hazards associated with the region in which free access by unscreened non-MRI staff or ferromagnetic objects or equipment can result in serious injury. Injury may occur as a result of the interaction between the individual or equipment and the immediate peripheral area of the MRI scan room. The four zone concept provides for progressive restrictions in access to the MRI scanner:

Zone I: This region includes all areas that are freely accessible to the general public. This area is typically outside the MRI environment itself and is the area through which patients, health care personnel, and other employees of the MRI site access the MRI environment.

Zone II: This area is the interface between the publicly accessible, uncontrolled Zone I and the strictly controlled Zones III and IV. Typically, patients are greeted in Zone II and are not free to move throughout Zone II at will, but are rather under the supervision of MRI personnel. It is in Zone II that the answers to MRI screening questions, patient histories, etc. are typically obtained.

Zone III: This area is the region in which free access by unscreened non-MRI personnel or ferromagnetic objects or equipment can result in serious injury or death as a result of interactions between the individuals and equipment and the MRI scanner’s particular environment. These interactions include, but are not limited to, those involving the MRI scanner’s static and time-varying magnetic fields. Specifically identified MRI personnel are to be charged with ensuring that MRI safe requirements are strictly adhered to for the safety of the patients and other non-MRI personnel, the health care personnel, and the equipment itself.

Zone IV: This area is synonymous with the MRI scanner magnet room itself, that is, the physical confines of the room within which the MRI scanner is located. Zone IV, by definition, will always be located within Zone III, as it is the MRI magnet and its associated magnetic field that generates the existence of Zone IV.
The term MRI environment refers to the general and immediate areas associated with the MRI scanner. In particular, this refers to the area within the 5 gauss line. The MRI environment includes anywhere within the MRI procedure room, including the center of the bore of the MRI scanner.

**Personnel**

MRI personnel and non-MRI personnel are used to define individuals who may come in contact with the magnetic field. This terminology will assist with access restrictions and controls. All individuals working within at least Zone III have documentation verifying successful completion of at least one of the MRI safety live lectures or prerecorded presentations approved by the MRI medical leader. Attendance should be repeated at least annually, and appropriate documentation should be provided to confirm these ongoing educational efforts.

Non-MRI personnel are accompanied by, or under the immediate supervision of and in visual or verbal contact with, one specifically identified level 2 MRI personnel for the entirety of their duration within Zone III or Zone IV restricted regions. However, it is acceptable to have non-MRI personnel in a changing room or restroom in Zone III without visual contact as long as the personnel and the patient can communicate verbally with each other.

There are two levels of MRI personnel:

**Level 1 MRI personnel**: Those who have passed minimal safety educational efforts to ensure their own safety as they work within Zone III are referred to as Level 1 MRI personnel. Level 1 MRI personnel are also explicitly permitted to be responsible for accompanying non-MRI personnel into and throughout Zone III, excluding Zone IV.

**Level 2 MRI personnel**: Those who have been more extensively trained and educated in the broader aspects of MRI safety issues (e.g. MRI technologists), including, for example, issues related to the potential for thermal loading or burns and direct neuromuscular excitation from rapidly changing gradients, are referred to as level 2 MRI personnel. It is understood that the medical leader will have the necessary education and experience in MRI safety to qualify as level 2 MRI personnel.

**Implants and devices**

Terminology applied to implants and devices relative to the MRI environment has evolved over the years. A new system developed by the American Society for Testing and Materials (ASTM) in August 2005 offers three categories: MR safe, MR conditional, and MR unsafe. This should provide better guidance to users than the previous system. The new MRI safety marking standard will only be effective if it is well understood and properly implemented by device manufacturers and MRI facilities. Users may still see a mix of devices with the old MRI safety markings and the new safety markings. During this period, users must know how to interpret the various device markings and how to ascertain which devices can and cannot be used in a particular MRI environment. One way for facilities to reduce confusion between the old and new terminologies is to consult with equipment suppliers to obtain the information needed to re-label equipment with the new markings as soon as possible.

MR safe is used for items that pose no known hazard in all MRI environments. Items which are wholly nonmetallic are identified with a square green “MR safe” label.
**MR conditional** is used for items have been demonstrated to pose no known hazards in a specified MRI environment with specified conditions of use. The safety of “MR conditional” items must be verified with the specific scanner and MRI environment in which they will be used. Objects with an “MR conditional” rating are affixed with a triangular yellow MR conditional label prior to being taken into the scan room/Zone IV.

**MR unsafe** is used for items which are clearly ferromagnetic, identified as “MR unsafe”, and labeled appropriately with the corresponding round red label with a slash through it. Any MR unsafe items are clearly labeled to ensure they are not taken into the room.

**MRS 1.0** The design of the facility and access restrictions minimize the potential hazards and risks associated with the magnetic field.

**MRS 1.1** Individuals knowledgeable in MRI safety are involved in planning and review of facility design plans for a new MRI installation.

**Intent:** There are many issues that impact MRI safety that are considered during facility planning for a given MRI installation including, but not limited to; cryogen emergency vent locations and pathways; 5-gauss lines; siting considerations; patient access pathways; etc. These issues and many others are reviewed with those individuals experienced in MRI facility planning and familiar with patient safety and patient flow considerations prior to committing to construction of a specific facility design. Enlisting the assistance of an architectural firm experienced in this area, and doing so early in the design stages of the planning process, may prove most valuable. Facility plans which incorporate the ACR 4 Zone Configuration with particular attention to all Zone III access restrictions will prevent harm to patients, staff and visitors. Note: For superconducting systems, consideration may be given to purchasing an oxygen sensor/monitor and alarm to provide information on the room oxygen levels. This would be helpful in managing a worst case scenario quench (e.g. gaseous helium does not vent out of the scan room and displaces oxygen). See also Magnetic Safety Accreditation Standard MRS 4.1.5.

**MRS 1.1.1**

- **M** Any new facility has incorporated the ACR 4 Zone Configuration into their design plans.

**Intent:** Of particular importance is ensuring Zone III regions are physically restricted from general public access by, for example; key locks, passkey locking systems or any other reliable, physically-restricting method. See also Magnetic Safety Accreditation Standard MRS 1.2.2.
MRS 1.2 Access restrictions ensure the safety of patients and all individuals who enter the MRI facility.

MRS1.2.1 M All access to Zone III is restricted, including access to regions within it (including Zone IV) are controlled by, and entirely under the supervision of, MRI personnel.

Intent: Specifically identified MRI personnel are to be charged with ensuring that this MRI safe practice guideline is strictly adhered to for the safety of the patients and other non-MRI personnel, the health care personnel, and the equipment itself. Non-MRI personnel are not provided with independent Zone III access until such time as they undergo the proper education and training.

MRS1.2.2 M Zone III regions are physically restricted from general public access by, for example, key locks, passkey locking systems, or any other reliable, physically restricting method.

MRS1.2.3 M Access controls are in place for all non-MRI personnel (e.g. medical staff who occasionally work in MRI, housekeeping staff, facility maintenance, repair personnel, security staff, etc. and non-MRI personnel called to the facility in the event of an emergency).

MRS1.2.4 M Only MRI personnel shall be provided free access, such as the access keys or passkeys, to Zone III.

MRS1.2.5 M Zone III, or at the very least the area within it wherein the static magnetic field strength exceeds 5 gauss, is clearly demarcated and labeled with prominently displayed danger signs to make all individuals and patients aware of the risks associated with the MRI system.

Intent: Based on the design and layout of the facility, danger signs are visible prior to entering Zone IV. Because magnetic fields are three-dimensional volumes, Zone III controlled access areas may project through floors and ceilings of MRI facilities, imposing magnetic field hazards on persons on floors other than that of the MRI scanner. Zones of magnetic field hazard (above 5 gauss) are clearly delineated, even in typically non-occupied areas such as rooftops or storage rooms, and access to these Zone III areas are similarly restricted from non-MRI personnel as they would be inside any other Zone III region associated with the MRI facility.

MRS1.2.6 M As part of the Zone IV site restriction, all MRI installations provide direct visual observation by level 2 personnel to access pathways into Zone IV.

Guidance: The MRI technologists are able to directly observe and control, via line of sight or via video monitors, the entrances or access corridors to Zone IV from their normal positions when stationed at their desks in the scan control room.

MRS1.2.7 M Fringe fields are established.

Intent: The 5 gauss line is used to define the margins for pacemaker safety.

MRS1.2.8 M There is a predetermined magnetically safe location where full resuscitative efforts are to be performed.

Intent: Because of risks associated with contrast agents, sedation, and anesthesia, each facility has the appropriate provisions for stabilization and resuscitation of patients. This predetermined location is preferably outside of Zone III. If the resuscitation area is within Zone III, it is well separated from the entrance to Zone IV.
ACCREDITATION STANDARDS
MAGNETIC SAFETY

MRS1.2.9 □ There is a separate storage area for ferromagnetic equipment and supplies (e.g. patient’s wheelchairs, portable oxygen, etc.).
Guidance: Unsafe appliances brought by the patient are secured in a “ferrous quarantine” storage area, distinct from the storage areas for MR safe and MR conditional equipment and located as far from zone III as possible to ensure they are not inadvertently brought into the MRI room.

MRS1.2.10 □ The MRI scan room door is locked during non-operational hours and is not left open except during patient entry and exit.

SAFETY-SCREENING

MRS 2.0 The establishment of thorough and effective safety-screening guards the safety of all those preparing to enter Zone III.

MRS 2.1 Screening procedures are strictly enforced to ensure safety to all individuals who enter the MRI facility.
Intent: The screening process and screening forms for patients, non-MRI personnel, and MRI personnel should be essentially identical. Specifically, one should assume that non-MRI personnel, health care practitioners, or MRI personnel may enter the bore of the MRI scanner during the MRI imaging process. Non-emergent patients are MRI safety-screened on site by a minimum of two separate individuals. At least one of these individuals is level 2 MRI personnel. At least one of these two screenings is performed verbally or interactively. Emergent patients and their accompanying non-MRI personnel may be screened only once, providing the screening individual is level 2 MRI personnel.
Patient weight is verified as this is necessary for both SAR limits and for determining gadolinium injection dose.

MRS2.1.1 □ Patients are questioned regarding the possibility of claustrophobia in advance of arrival to the MRI service.

MRS2.1.2 □ There are documented screening procedures in place for all individuals who enter the MRI environment.

The screening procedures take into consideration the following:

MRS2.1.3 □ a multi-tiered (duplicate) approach.
MRS2.1.4 □ conscious patients.
MRS2.1.5 □ unconscious patients.
MRS2.1.6 □ supporting individuals.
MRS2.1.7 □ clients and staff.

MRS2.1.8 □ Patients and non-MRI personnel with a history of metallic foreign object penetration undergo further investigation.

MRS2.1.9 □ There is a process in place to review previous or to request pre-MRI imaging to rule-out metallic or other implanted objects that may be contraindicated in an MRI scan.

MRS2.1.10 □ The MRI radiologist is involved in assessing any contraindications.
MRS2.1.11  Patients are prepared for the MRI examination in an appropriate safe zone and moved into the examination room once determined safe to do so.

Guidance: Any individual undergoing an MRI examination is to remove all readily removable metallic personal belongings and devices on or in them (e.g., watches, jewelry, pagers, cell phones, body piercings [if removable], metallic drug delivery patches, cosmetics containing metallic particles [such as eye make-up], and clothing items that may contain metallic fasteners, hooks, zippers, loose metallic components, or metallic threads). It is therefore advisable to require that the patients wear a facility-supplied gown with no metal fasteners when feasible. Lockers or alternate provisions for safe and secure storage of such personal belongings are available.

MRS 2.2  Standardized and detailed screening forms include questions on MRI hazards and contraindications including, but not limited to:

Note: Examples of screening forms are available on www.mrisafety.com

- MRS2.2.1  Pacemakers.
- MRS2.2.2  Aneurysm clips.
- MRS2.2.3  Metallic and/or electronic implants.
- MRS2.2.4  Metallic foreign bodies.
- MRS2.2.5  Pregnancy status.

Intent: There is no scientific basis to believe that an MRI examination is hazardous to a pregnant woman; however, in view of the relatively limited experience with this clinical diagnostic modality, an individual assessment is made for each pregnant patient.

- MRS2.2.6  Allergies and conditions that preclude the use of contrast (e.g. history/risk factors of kidney disease or dialysis, previous MRI contrast agent allergic reaction, etc.). See also Global Modality Accreditation Standards GM 4.5.

MRS 2.3  Device and object screening is an effective component of MRI safety.

- MRS2.3.1  As part of the Zone III site restriction and equipment testing and clearing responsibilities, all facilities have ready access to a strong handheld magnet (≥ 1000 gauss).

Guidance: All unknown external objects or devices being considered for introduction beyond Zone II are tested with a strong handheld magnet (≥ 1000 gauss) for ferromagnetic properties before permitting them entry to Zone III.

- MRS2.3.2  The results of any handheld magnet testing, as well as the date, time, and name of the tester is documented in writing. If a device has not been tested, or if its MRI compatibility or safety status is unknown, it is not permitted unrestricted access to Zone III.
Guidance: External devices or objects demonstrated to be ferromagnetic and MR unsafe or incompatible in the MRI environment may still, under specific circumstances, be brought into Zone III if, for example, they are deemed by MRI personnel to be necessary and appropriate for patient care. They are only be brought into Zone III if they are under the direct supervision of specifically designated level 1 or level 2 MRI personnel who are thoroughly familiar with the device, its function, and the reason supporting its introduction to Zone III. The safe utilization of these devices while they are present in Zone III will be the responsibility of specifically named level 1 or 2 MRI personnel.

These devices are appropriately physically secured or restricted at all times during which they are in Zone III to ensure that they do not inadvertently come too close to the MRI scanner and accidentally become exposed to static magnetic fields or gradients that might result in their becoming either hazardous projectiles or no longer accurately functional.

MRS2.3.3 M □ There is a current MRI safety reference used as a guide in determining the MRI safety of certain implanted metallic or electronic devices and/or foreign objects.

MRS 3.0 Safety precautions prevent accidents and injuries in the MRI environment.

MRS 3.1 All ancillary equipment intended to be taken into the MRI scan room is clearly identified.

Intent: Particularly with regard to non-clinical and incidental equipment, current products marketed with ill-defined terminology such as “non-magnetic,” or outdated classifications such as “MRI-compatible,” are not to be presumed to conform to a particular current ASTM classification. Similarly, any product marketed as “MR safe” but with metallic construction or components are to be treated with suspicion. Objects intended for use in Zone IV, including non-clinical incidental products such as stepping stools or ladders, which are not provided with manufacturer or third-party MRI safety test results under the new ASTM criteria, are facility tested.

MRS3.1.1 M □ The ancillary equipment intended to be taken into the scan room has clear and appropriate MR safe or MR conditional safety labels.

Intent: No equipment or devices are brought into the MRI environment unless it is proven to be MR safe or MR conditional. The safety of “MR conditional” items is verified with the specific scanner and MRI environment in which they will be used.

MRS3.1.2 M □ All equipment used for sedation and monitoring, resuscitation, and anesthesia and monitoring is MR safe or MR conditional, operational and readily available.

MRS3.1.3 M □ Floor markings indicate the safe location of the MR conditional equipment.

Guidance: For example, physiological monitoring device performance and safety may be impacted if they are too close to the magnet.

MRS3.1.4 M □ Mechanisms are in place to prevent the inadvertent displacement of the MR conditional equipment beyond the floor markings.

MRS3.1.5 M □ There is a clearly marked, readily accessible MR conditional or MR safe fire extinguisher physically stored in Zone III or Zone IV.

MRS3.1.6 M □ All conventional fire extinguishers not tested and verified MR safe or conditional are restricted from Zone III.
## ACCREDITATION STANDARDS

### MAGNETIC SAFETY

#### MRS 3.2

**Patient safety is monitored before, during and after a MRI examination.**

| MRS3.2.1 | M ☐ Except for emergent coverage, there are a minimum of two MRI technologists or one MRI technologist and one other individual with the designation of MRI personnel in the immediate Zone II through Zone IV MRI environment or, in the case of only one technologist, they are able to attend fully and continuously to the patient throughout the period for which the patient is within Zone IV. |
| MRS3.2.2 | M ☐ There is appropriate operating console ergonomics so the technologist has a direct view of the patient down the bore of the magnet. |
| MRS3.2.3 | M ☐ Mechanisms are in place to ensure patient communication during the examination. |
| MRS3.2.4 | M ☐ For superconducting systems, adequate hearing protection is provided to any individual in the scan room during the examination.  
*Note: At field strengths below 0.5T, the need for hearing protection should be reviewed in light of the noise levels generated by the system.* |
| MRS3.2.5 | M ☐ Methods are in place for managing patients with claustrophobia, anxiety and emotional stress. |
| MRS3.2.6 | M ☐ The MRI system consists of either a detachable MRI transport table or chair or a table top with trolley device or MRI compatible transfer device for the purpose of emergency egress from the scan room. |
| MRS3.2.7 | M ☐ When it is necessary to initiate emergency resuscitation in the MRI room, it is only performed by screened authorized individuals using MR safe or MR conditional equipment.  
*Guidance: In the case of cardiac or respiratory arrest or other medical emergencies within Zone IV for which emergent medical intervention or resuscitation is required, appropriately trained and certified MRI personnel immediately initiate basic life support or CPR as required by the situation while the patient is being emergently removed from Zone IV to a predetermined, magnetically safe location. After the patient is removed the scan room door is secured to prevent inadvertent entry into the room by non MRI personnel responding to resuscitate the patient.* |
| MRS3.2.8 | ☐ All MRI facilities perform regular drills to rehearse and refine emergency response protocols to protect patients, MRI staff, and responders. |

#### MRS 3.3

**Equipment is safety monitored and maintained.**

| MRS3.3.1 | M ☐ The MRI system produces a warning and abort scan when RF power deposition limits are exceeded. |
| MRS3.3.2 | M ☐ There is adequate ventilation in the equipment (e.g. gradient and RF amplifier) and cryogen storage room. |
| MRS3.3.3 | M ☐ Cryogen vent systems are visually inspected annually  
*Intent: To identify and correct potential weaknesses that could potentially fail in a quench.* |
| MRS3.3.4 | M ☐ Helium dewar storage in patient areas is prohibited and when stored in staff areas is not left unattended for an extended length of time. |
SAFETY EDUCATION

MRS 4.0 The MRI service has a safety program.

MRS 4.1 There is an MRI safety manual with policies and procedures that include, but are not limited to:

MRS4.1.1 M responding to a fire alarm and fire within the scan room when staff is either present or absent in the service.

Evacuation quench provisions for superconductive magnets include:

MRS4.1.2 M a clearly marked quench-activation device.
MRS4.1.3 M evacuation procedures for patients and staff.
MRS4.1.4 M a fail-safe ventilation path for quenched helium.
MRS4.1.5 M a protocol for managing the worst case scenario quench (e.g. gaseous helium does not vent out of the scan room and displaces oxygen).

Guidance: The protocol includes the methods for the rescue of patients and staff in the above mentioned worst case scenario quench. Care is necessary to ensure it is safe to enter the room to rescue a patient.

MRS 4.2 Ongoing safety education is provided to MRI personnel.

MRS4.2.1 M There is a designated MRI safety officer.
MRS4.2.2 M All individuals working within at least Zone III have documentation verifying successful completion of at least one of the MRI safety live lectures or prerecorded presentations approved by the MRI medical leader. Attendance is repeated at least annually, and appropriate documentation is provided to confirm these ongoing educational efforts.

MRS4.2.3 M MRI technologists undergo an annual review of MRI safety policies and procedures.

The annual review of MRI safety policies and procedures includes but is not limited to:

MRS4.2.4 M emergency shutdown procedures for abolishing the main magnetic field and electrical power shutdown.
MRS4.2.5 M policies and procedures to deal with an inadvertent magnet quench.
MRS4.2.6 M policies and procedures for rescue of a person involved in a MRI accident.
MRS 4.3  

Education is provided to non-MRI personnel who may come in contact with the magnet.

**Intent:**  For the safety of firefighters and other emergent services responding to an emergent call at the MRI facility, it is recommended that all fire alarms or other emergent service response calls originating from or located in the MRI facility are forwarded simultaneously to a specifically designated individual from among the facility’s MRI personnel. This individual, if possible, is on-site prior to the arrival of the firefighters or emergent responders to ensure that they do not have free access to Zone III or Zone IV. The facility might consider assigning appropriately trained security personnel, who have been trained and designated as MRI personnel, to respond to such calls. In any case, all MRI facilities arrange to prospectively educate their local fire marshals, firefighters’ associations, and police or security personnel about the potential hazards of responding to emergencies in the MRI suite. It is stressed that even in the presence of a true fire (or other emergency) in Zone III or Zone IV; the magnetic fields may be present and fully operational. Therefore, free access to Zone III or Zone IV by firefighters or other non-MRI personnel with air tanks, axes, crowbars, other firefighting equipment, guns, etc., might prove catastrophic. See also Magnetic Safety Accreditation Standard MRS 1.2.3

**MRS4.3.1**  

**M** housekeeping staff.  
*Guidance: Housekeeping staff only enter Zone IV when no patient is in the MRI room and when level 2 personnel are in the facility to supervise.*

**MRS4.3.2**  

**M** municipal emergency response staff.  
*Guidance: The MRI safety officer is to make arrangements with the firefighter educator to ensure MRI safety is included in the orientation of new staff and as part of their periodic training schedule.*

**MRS4.3.3**  

**M** security staff.

MRS 4.4  

There are established processes to continually assess hazards and incidents to improve the safety of the service.

**MRS4.4.1**  

**M** MRI safety policies and procedures are authorized and reviewed by the medical leader and technical leader on an annual basis, or with the introduction of any significant changes in safety parameters of the MRI environment (e.g. adding faster or stronger gradient capabilities).

**MRS4.4.2**  

**M** There is an assessment of any and all adverse events, MRI safety incidents or “near incidents” that occur in the MRI service.

**MRS4.4.3**  

Incidents (e.g. projectiles, equipment malfunctions, failure to complete examinations due to patient distress, etc.) are reported to the medical leader in a timely fashion and used in continuous quality improvement efforts.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:

The contents of the American College of Radiology, ACR Guidance Document for Safe MR Practices, 2007 have been adapted to develop the DAP Magnetic Safety Accreditation Standards.


College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.

The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.


SPECIFIC DOCUMENTS REFERENCED

1 MRI Safety at 3T versus 1.5T. The Internet Journal of Radiology. 2010 Volume 11,Number 1


ACCREDITATION STANDARDS 2010

NUCLEAR MEDICINE

The Nuclear Medicine Accreditation Standards are used in conjunction with the Global Modality Accreditation Standards.

Introduction:
In addition to the Global Modality Accreditation Standards, the modality specific Accreditation Standards for Nuclear Medicine provide additional mandatory requirements and best practices for accreditation in the modality of Nuclear Medicine.

The Nuclear Medicine section of the Accreditation Standards address additional requirements related to:
- Examination requests
- Patient preparation
- Procedures
- Medical records
- Interpretation and results
- Equipment
- Appropriate physician environment

Definition:
In the context of these Accreditation Standards, the term qualified physician refers to a physician credentialed by the Diagnostic Accreditation Program to perform nuclear medicine services:
- A certified nuclear medicine physician, or a
- physician credentialed to perform nuclear cardiology, or a
- radiologist performing limited nuclear medicine services
EXAMINATION REQUEST

NM 1.0  Examination requests are standardized and ensure that accurate, comprehensive and appropriate information is relayed.

NM 1.1  Processing of the examination requests ensures:

See also Global Modality Accreditation Standards GM 1.1.

NM1.1.1 M ☐ there is a review by a qualified physician or delegate for appropriateness, priority and protocol assignment, prior to booking the examination.

PATIENT PREPARATION

NM 2.0  Patients are appropriately prepared for the examination being performed.

NM 2.2  Pre-examination information is collected and assessed prior to commencing the examination.

See also Global Modality Accreditation Standards GM 2.2.

NM2.2.1 M ☐ Contraindications are identified (e.g. pregnancy, breastfeeding, medications, allergies, etc.) and documented.

NM2.2.2 M ☐ A qualified physician is involved in assessing any contraindications.

PROCEDURES

NM 3.0  Standard protocols result in images and diagnostic data appropriate for their intended use in clinical decision-making.

NM 3.1  There is a comprehensive process in place for protocol adoption and development.

See also Global Modality Accreditation Standards GM 3.1.

NM3.1.1 M ☐ Protocols are reviewed every 1-3 years by qualified individual(s).

NM 3.2  Protocols include all the information necessary to perform the examination.

Protocol information includes, but is not limited to:

NM3.2.1 M ☐ the equipment/supplies needed.

NM3.2.2 M ☐ a description of patient positioning (e.g. supine, prone, posterior, anterior, head in, head out, arms up, arms down, etc.)

NM3.2.3 M ☐ the technical parameters.

Guidance: The protocols are to include technical parameters such as camera setup (e.g. collimator, zoom, orbit and orbit type, gating, etc.) and computer acquisition instructions (e.g. views, timing of views, timing/counts per view and attenuation correction if used).
NM 3.3 Examinations are performed following established protocols.
NM3.3.1 M Protocols are readily available to staff performing the examination.
NM3.3.2 M Protocols are equipment specific, where appropriate.

NM 3.4 There are established procedures in place for the preparation and administration of radiopharmaceuticals.
NM3.4.1 M Written protocols for the preparation and administration of radiopharmaceuticals are readily available.
NM3.4.2 M Radiopharmaceuticals are prepared according to manufacturer's specifications or there is documentation to validate product stability and/or efficacy of the off-label preparation.
NM3.4.3 M The radiopharmaceutical is identified along with the dosage, timing and route of administration. Doses do not exceed the established facility protocols.
NM3.4.4 M There are dose protocols for the pediatric population.  
Guidance: Doses are to be calculated by weight if a procedure does not follow a standardized dose.
NM3.4.5 M Radiopharmaceuticals are administered for indications according to manufacturer's specifications or there is documentation to validate its efficacy of the off-label use.  
Guidance: In rare instances, radiopharmaceuticals may be used for indications other than manufacturer's specifications (e.g. \(^{99m}\)Tc MDP is used in lieu of \(^{99m}\)Tc DTPA for aerosol lung imaging). In these instances there is documentation to validate the practice of using alternate radiopharmaceuticals.
NM3.4.6 M Verification of patient identity is confirmed prior to the administration of a radiopharmaceutical.
NM3.4.7 M All relevant radiopharmaceutical information is documented and remains a permanent part of the patient record (e.g. radiopharmaceutical, dose, route, site, date, time, identity of person administering, and known interstitial injection.)

NM 3.5 There are established procedures in place for the preparation and administration of pharmacologic agents.
NM3.5.1 M Policies and procedures are in place for technologists who administer pharmacologic agents.  
Guidance: See also Medical Staff Accreditation Standards DMS 4.0 regarding delegation of medical acts.
NM3.5.2 M Written protocols for the preparation and administration of pharmacologic agents are readily available.
NM3.5.3 M All pharmacologic agents are prepared and administered as per manufacturer's specifications.
NM3.5.4 M A nuclear medicine physician or delegated physician is responsible for direct supervision to treat any potential reactions or complications that may arise.  
Guidance: Direct supervision means that the physician be present and immediately available to furnish assistance and direction throughout the performance of the procedures. It does not mean that the physician be present in the room where the procedure is performed.
Prior to administration the agent is visually inspected for colour, clarity and expiration date.

Verification of patient identity is confirmed prior to the administration of a pharmacologic agent.

All relevant pharmacologic information is documented and remains a permanent part of the patient record (e.g. pharmacologic agent, dose, route, site, date, time, identity of person administering, etc.)

Storage of pharmacologic agents complies with manufacturer’s recommendations.

Medication reconciliation processes are established to prevent errors.

Guidance: See also Patient Safety Accreditation Standards DPS 4.4

Radiotherapy protocols contain all the necessary information to ensure they are safely performed.

The radiopharmaceutical is identified along with the dosage, timing and route of administration.

There is a written prescription signed and dated by the authorized treating physician.

The authorized treating physician is responsible for direct supervision to treat any potential reactions or complications that may arise.

Guidance: Direct supervision means that the physician be present and immediately available to furnish assistance and direction throughout the performance of the procedures. It does not mean that the physician be present in the room where the procedure is performed. Ultimately the medical leader is responsible for determining the authorized treating physician.

Other pharmaceuticals used in the procedure are identified along with the dosage, timing, route of administration and any precautions and restrictions.

Radiotherapy treatment procedures include:

Documented consultation by a physician qualified in radiotherapy.

Obtaining informed consent.

Guidance: See also Patient and Client Focus Accreditation Standards DPC 3.4

Ongoing patient monitoring.

Guidance: When a patient requires hospitalization as part of receiving radiotherapy, nuclear medicine staff is involved in monitoring the dose rate from the patient.

Medical record documentation.

Communicating radiation precautions following treatment.

Guidance: Depending on the therapy given, patient instructions may include maintaining distance from others, control of body fluids, handling of potentially radioactive household trash, and the duration of these restrictions. Additionally, if relevant, guidance concerning breast feeding or the cessation thereof is also included.

All relevant radiopharmaceutical information is documented and remains a permanent part of the patient record (e.g. radiopharmaceutical, dose, route, site, date, time, identity of person administering, and known interstitial injection.)
Exercise and/or pharmacologic stress testing is performed in a safe environment and according to established protocols.

NM 3.7.1 An authorized physician is responsible for direct supervision to treat any potential reactions or complications that may arise.

Guidance: Direct supervision means that the physician be present and immediately available to provide assistance and direction throughout the performance of the procedures. It does not mean that the physician be present in the room where the procedure is performed. Ultimately the medical leader is responsible for determining the authorized physician.

NM 3.7.2 Appropriately qualified supplementary staff is present and actively participate in patient safety tasks.

The tasks include:

- NM 3.7.3 Treadmill operation.
- NM 3.7.4 Electrocardiogram (ECG) monitoring.
- NM 3.7.5 Medication infusion and patient monitoring.
- NM 3.7.6 There is an emergency crash cart that is available to reach the patient within 30 seconds.
- NM 3.7.7 An emergency drug tray is available in the room.

The contents of the emergency drug tray include, but are not limited to:

- NM 3.7.8 Nitroglycerine, in tablet or aerosol spray.
- NM 3.7.9 Epinephrine.
- NM 3.7.10 Atropine.
- NM 3.7.11 Intravenous supplies.
- NM 3.7.12 Parenteral antihistamine.
- NM 3.7.13 Parenteral antiemetic.
- NM 3.7.14 Short-acting bronchodilator (e.g. salbutamol) either in a metered-dose inhaler with a spacer device or as a solution with a nebulizer administration unit, ventolin nebules or as a discus device.

NM 3.7.15 Stress testing protocols include a description of graded protocols (e.g. speed, incline and workload, if applicable) and/or infusion details.

The protocols include, but are not limited to:

- Timing of assessing symptoms, heart rate, blood pressure and ECG tracings (using 12-lead).
  Intent: The protocols include instructions for the time of measurement of symptoms, heart rate, blood pressure and electrocardiographic findings.

- Radiopharmaceutical injection criteria and exercise/testing end points.
  Intent: Injection criteria and end points include any specific events that are reasons for stopping the stressing activity (such as duration of pharmaceutical administration or specific symptoms at peak exercise). Reasons for early termination are also included.

- Requirements for post-stress monitoring.
- Identification and treatment of common adverse events (e.g. hypertension, dyspnea, chest pain).
Images are reviewed for diagnostic quality before the patient is released. Image review ensures the:

NM3.8.1 M ☐ appropriate anatomic area of interest is included.
NM3.8.2 M ☐ presence of artifacts and motion does not impact the diagnostic image quality.
NM3.8.3 M ☐ count density is adequate.
NM3.8.4 M ☐ evidence of anatomic markers, where appropriate.
NM3.8.5 M ☐ Attenuation maps are reviewed for diagnostic quality and artifacts.
NM3.8.6 M ☐ Single Photon Emission Computed Tomography/Computed Tomography (SPECT/CT) images are reviewed to verify co-registration in all planes.

MEDICAL RECORD

The medical record is current, accurate and contains quality diagnostic images and relevant examination details.

Comprehensive examination details are recorded in the medical record that includes:

NM7.2.1 M ☐ pregnancy and breast feeding status.
NM7.2.2 M ☐ known medications and allergies, relevant to the examination.
NM7.2.3 M ☐ date of Last Menstrual Period (LMP), for women of child-bearing age.
NM7.2.4 M ☐ radiopharmaceutical agent being identified including the dosage, time, route of administration and the individual administering.
NM7.2.5 M ☐ pharmacologic agents being identified including the dosage, time, route of administration, individual administering and any precautions or restrictions.

ECG’s include standardized identification as outlined in the protocols.

ECG tracings identify the:

NM7.3.1 M ☐ patient name.
NM7.3.2 M ☐ second patient identifier (e.g. identifying number and/or date of birth).
NM7.3.3 M ☐ facility name.
NM7.3.4 M ☐ date and time of examination.
NM7.3.5 M ☐ ECG tracings and summarized findings are recorded in the patient record and are readily available.
INTERPRETATION AND REPORTS

NM 8.0 Diagnostic reports are in a standardized format that provides comprehensive and necessary information for clinical decision-making.

NM 8.2 Reports contain sufficient information to assist in diagnosis.
See also Global Modality Accreditation Standards GM 8.2.
The body of the report includes the following:

NM8.2.1 M √ procedures performed and materials.
Guidance: An adequate description of the procedure performed. The description includes the name of the procedure (type of the examination(s) or protocol). It also includes the specific name, specific amount, and route of administration of any radioactive or non-radioactive material administered. If applicable, the type of stress, pharmacologic agent, dose and route of administration is described. If applicable the type and use of attenuation correction is specified.4

NM8.2.2 M √ findings.
Guidance: Non-imaging data such as stress test responses and summarized findings are included when applicable. Stress testing data reported includes patient response to stress.4

EQUIPMENT

NMES 2.0 Equipment testing is performed prior to clinical use.
See also Equipment and Supplies Accreditation Standards DES 2.1.

NMES 2.1 Acceptance testing is performed by a medical physicist after purchase and prior to clinical use of gamma camera systems that includes assessment of:

NMES2.1.1 M √ multiple-window registration.
NMES2.1.2 M √ maximum count rate.
NMES2.1.3 M √ 20% loss count rate.
NMES2.1.4 M √ system sensitivity for each collimator.
NMES2.1.5 M √ pixel size calibration.
NMES2.1.6 M √ camera performance at high count rate.
NMES2.1.7 M √ center of rotation verification for all camera head configurations and collimator sets used clinically.
Guidance: Center of rotation protocol is to be performed according to manufacturer protocol.

NMES2.1.8 M √ bar phantom assessment.
Guidance: An extrinsic (with collimators) bar phantom is to be acquired for 5 million counts.

NMES2.1.9 M √ tomographic uniformity reconstruction.
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NMES 2.10  M  ☐ extrinsic uniformity evaluation.
  Guidance: An extrinsic (with collimators) uniformity flood is to be acquired for 30 million counts on all collimators routinely used to verify collimator integrity.

NMES 2.11  M  ☐ high count intrinsic uniformity flood evaluation according to manufacturer’s recommendations.
  Guidance: Using a point source of $^{99m}$Tc, acquire a 30 million count flood; compare values to manufacturer’s values.

NMES 2.12  M  ☐ uniformity flood evaluation for radionuclides other than $^{99m}$Tc according to manufacturer’s recommendations.
  Guidance: An intrinsic (without collimators) uniformity flood is to be acquired for 5-10 million counts for other radionuclides routinely used.

NMES 2.13  M  ☐ Jaszczak phantom reconstruction.

NMES 2.14  ☐ tomographic resolution assessment.
  Guidance: Perform a SPECT of capillary tubes to assess tomographic resolution.

NMES 2.15  ☐ energy resolution assessment.
  Guidance: Use manufacturer algorithm.

NMES 2.16  ☐ spatial resolution assessment.
  Guidance: Use an intrinsic bar phantom to assess spatial resolution.

NMES 2.2  Acceptance testing is performed after purchase and prior to clinical use of well counter systems that includes:

- NMES 2.2.1  M  ☐ crystal energy resolution.
- NMES 2.2.2  M  ☐ linear geometry and sensitivity.
- NMES 2.2.3  M  ☐ minimum/maximum detectable levels.

NMES 2.3  Acceptance testing is performed after purchase and prior to clinical use of uptake probe systems that includes:

- NMES 2.3.1  M  ☐ crystal energy resolution.

NMES 2.4  Acceptance testing is performed after purchase and prior to clinical use of dose calibrator systems that includes:

- NMES 2.4.1  M  ☐ geometrical sensitivity.

NMES 2.5  Acceptance testing is performed after purchase and prior to clinical use of SPECT/CT hybrid systems.

- NMES 2.5.1  M  ☐ For all SPECT/CT hybrid systems, the radiation levels are monitored at critical areas in the imaging room (e.g. bedside, doorway, workstation, etc) at acceptance testing and after CT tube replacement.
- NMES 2.5.2  M  ☐ For SPECT/CT hybrid systems performing independent diagnostic CT, acceptance testing is performed according to CTES 2.1 (CTES2.1.1 - CTES2.1.17).
NMES 3.0  Quality Assurance programs are established to ensure the attainment of intended quality.
See also Equipment and Supplies Accreditation Standards DES 3.0.

Definitions:

**Linearity Test:** This test is designed to prove that the dose calibrator readout is linear for sources varying from the kBq range through the GBq range. A high activity $^{99m}$Tc source (1-11 GBq) is measured at $T_0$ and at predetermined time intervals up to 48 hours. Expected and actual measurements are compared (and may be analyzed graphically) to determine if the instrument is linear throughout the activity range one is likely to encounter.

**Geometry Test:** This test is designed to show that correct readings can be obtained regardless of the sample size or geometry. One ml of $^{99m}$Tc in a 10 ml syringe (activity 925 MBq) is measured in the dose calibrator and the value obtained is recorded. The activity is then diluted with water to 2 ml, 3 ml, 5 ml and 10 ml. At each of these points a reading is taken and the value recorded. Data are then evaluated to determine the effect of sample geometry on the dose calibrator reading. If instrument is geometry-dependent, it may be necessary to routinely correct readings obtained when using calibrator. GEOMETRY TEST IS ALSO PERFORMED AFTER REPAIR, RECALIBRATION OR AFTER MOVING INSTRUMENT.

**Accuracy Test:** This test is designed to show that the calibrator is giving correct readings throughout the entire energy scale that one is likely to encounter. Low, medium, and high energy standards (usually $^{57}$Co, $^{133}$Ba or $^{137}$Cs and $^{60}$Co, respectively), are measured in the dose calibrator using appropriate settings. Standard and measured values are compared.

**Constancy Test:** This test measures precision and is designed to show that using a long-lived source, usually $^{137}$Cs (30 year half-life), reproducible readings are obtained day after day on all the various isotope settings one is likely to use. The long-lived source is placed in the dose calibrator. Activity is then measured on the $^{137}$Cs setting and all other routinely used settings on a daily basis. Values are recorded in the appropriate logbook and are compared with recent values to determine if instrument is maintaining constancy on a day-to-day basis.

**Guidance:**
- An intrinsic (without collimators) uniformity flood is to be acquired for 5-10 million counts using a $^{99m}$Tc point source;
- An extrinsic (with collimators) uniformity flood is to be acquired for 5-10 million counts using a $^{57}$Co sheet source.

NMES 3.1  Daily Quality Control procedures are established and used to monitor gamma camera systems that includes:

| NMES3.1.1 | M ☐ room background (for intrinsic floods) measurement. |
| NMES3.1.2 | M ☐ $^{99m}$Tc peak position verification or calibration. |
| NMES3.1.3 | M ☐ uniformity flood (e.g. intrinsic or extrinsic) |
| NMES3.1.4 | M ☐ For SPECT/CT hybrid systems, CT component quality control is performed according to the manufacturer’s recommendations and using the CT phantom supplied with the system. |

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NMES 3.2  
**Monthly Quality Control procedures** are established and used to monitor **gamma camera systems** that includes:

- **NMES3.2.1**
  - M center of rotation verification for all camera head configurations and collimator sets used clinically.  
  - **Guidance:** Center of rotation protocol is to be performed according to manufacturer protocol.

- **NMES3.2.2**
  - M bar phantom assessment.  
  - **Guidance:** An *extrinsic* (with collimators) bar phantom is to be acquired for 5 million counts.

NMES 3.3  
**Quarterly Quality Control procedures** are established and used to monitor **gamma camera systems** that includes:

- **NMES3.3.1**
  - M tomographic uniformity reconstruction.

- **NMES3.3.2**
  - M extrinsic uniformity evaluation.  
  - **Guidance:** An *extrinsic* (with collimators) uniformity flood is to be acquired for 30 million counts on all collimators routinely used to verify collimator integrity.

NMES 3.4  
**Annual Quality Control procedures** are established and used to monitor **gamma camera systems** that includes:

- **NMES3.4.1**
  - M high count intrinsic uniformity flood evaluation according to manufacturer’s recommendations.  
  - **Guidance:** Using a point source of $^{99m}$Tc, acquire a 30 million count flood; compare values to acceptance testing values.

- **NMES3.4.2**
  - M uniformity flood evaluation for radionuclides other than $^{99m}$Tc according to manufacturer’s recommendations.  
  - **Guidance:** An *intrinsic* (without collimators) uniformity flood is to be acquired for 5-10 million counts for other radionuclides routinely used. This procedure may be performed more frequently depending on how often radionuclides other than $^{99m}$Tc are used.

- **NMES3.4.3**
  - M Jaszczak phantom reconstruction.

- **NMES3.4.4**
  - M tomographic resolution assessment.  
  - **Guidance:** Perform a SPECT of capillary tubes to assess tomographic resolution.

- **NMES3.4.5**
  - M energy resolution assessment.  
  - **Guidance:** Use manufacturer algorithm.

- **NMES3.4.6**
  - M spatial resolution assessment.  
  - **Guidance:** Use an intrinsic bar phantom to assess spatial resolution.

NMES 3.5  
**Quality Control procedures** are established and used to monitor **SPECT/CT hybrid systems**.

- **NMES3.5.1**
  - M For SPECT/CT hybrid systems performing independent diagnostic CT, quality control procedures are performed according to CTES3.1 - CTES3.6.
NMES 3.6  Daily Quality Control procedures are established and used to monitor well counter systems that includes:

NMES3.6.1  M  background activity measurement each time the well counter is used.
NMES3.6.2  M  calibration using a reference standard.

Guidance: This is to be performed by the technologist using a $^{57}$Co or $^{137}$Cs source.

NMES 3.7  Quarterly Quality Control procedures are established and used to monitor well counter systems that includes:

NMES3.7.1  M  chi square reproducibility test.
NMES3.7.2  M  normalization for multi-well counter systems.

NMES 3.8  Daily Quality Control procedures are established and used to monitor uptake probe systems that includes:

NMES3.8.1  M  background activity measurement each time the uptake probe is used.
NMES3.8.2  M  calibration using a reference standard ($^{57}$Co, $^{137}$Cs).
NMES3.8.3  M  confirmation of proper window settings on radionuclides.

NMES 3.9  Quarterly Quality Control procedures are established and used to monitor uptake probe systems that includes:

NMES3.9.1  M  chi square reproducibility test.

NMES 3.10  Annual Quality Control procedures are established and used to monitor uptake probe systems that includes:

NMES3.10.1  M  counting efficiency assessment.

NMES 3.11  Daily Quality Control procedures are established and used to monitor dose calibrator systems that includes:

NMES3.11.1  M  zero and background verification.
NMES3.11.2  M  instrument function test (battery test).
NMES3.11.3  M  constancy assessment.

NMES 3.12  Quarterly Quality Control procedures are established and used to monitor dose calibrator systems that includes:

NMES3.12.1  M  instrument linearity.

NMES 3.13  Annual Quality Control procedures are established and used to monitor dose calibrator systems that includes:

NMES3.13.1  M  accuracy assessment.
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**NMES 3.14**  
Annual Quality Control procedures are established and used to monitor radiation survey meters that includes:

- NMES3.14.1: M radiation survey meter calibration is to be performed by an outside agency.

**NMES 3.15**  
Daily Quality Control procedures are to be performed for $^{99m}$Mo/$^{99m}$Tc$_4$ Generators. The following procedures are performed on each $^{99m}$Tc$_4$ eluate to evaluate:

- NMES3.15.1: M $^{99m}$Mo breakthrough.
- NMES3.15.2: M aluminum breakthrough.
- NMES3.15.3: M clarity and volume.
- NMES3.15.4: M eluate assay.

**NMES 3.16**  
Daily Quality Control procedures are to be performed for radiopharmaceutical preparations. The following procedures are performed each time a radiopharmaceutical is prepared:

- NMES3.16.1: M clarity check.
- NMES3.16.2: M radiochemical purity checked prior to injection.
- NMES3.16.3: M particle size determination always carried out for $^{99m}$Tc MAA.
- NMES3.16.4: M pH is checked for injectable sulphur colloid preparations.
- NMES3.16.5: M There is a protocol for adjusting $^{99m}$Tc MAA particle count for compromised patients.

**NMES 3.17**  
The following records are to be kept for $^{99m}$Tc radiopharmaceuticals:

- NMES3.17.1: M kit and generator lot number.
- NMES3.17.2: M diluents used.
- NMES3.17.3: M quality control test results for eluates and in-house prepared kits.
- NMES3.17.4: M doses dispensed to patients.
- NMES3.17.5: M identification of personnel who prepared and tested kits.
- NMES3.17.6: M storage and disposal of waste material.
- NMES3.17.7: M a mechanism in place to report adverse reactions.
- NMES3.17.8: M a mechanism in place to report misadministrations.
- NMES3.17.9: M radiopharmaceuticals are prepared according to manufacturer's specifications or there is documentation to validate product stability and/or efficacy of the off-label preparation.

**NMES 3.18**  
Radiopharmaceuticals other than $^{99m}$Tc are safely and effectively managed:

- NMES3.18.1: M Records are kept for the receipt of other radiopharmaceuticals (e.g. $^{67}$Ga, $^{201}$Tl, $^{131}$I, etc.).
- NMES3.18.2: M Commercial radiopharmaceuticals are assayed in a dose calibrator.
- NMES3.18.3: M A visual check is performed.
- NMES3.18.4: M Records are kept for the storage and disposal of waste material.
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NMES 3.19 Radiopharmaceuticals are labeled with the following:
Guidance: The radiopharmaceutical name or unique identifier must be included on the label.

NMES3.19.1 M ☐ total volume.
NMES3.19.2 M ☐ total activity.
NMES3.19.3 M ☐ assay time and expiry.

NMES 5.0 Examinations are retrievable in a timely manner.
Intent: This standard is to be addressed by those facilities that do not archive to PACS and have a stand-alone digital archival.

NMES 5.1 Processes are in place to ensure images are readily accessible to the service, clients and patients.
NMES5.1.1 ☐ There is sufficient space for data storage.
NMES5.1.2 M ☐ Digital back-up is performed daily.
NMES5.1.3 M ☐ A second copy of examination data is securely stored in a separate physical location.
NMES5.1.4 ☐ NM raw digital image data is retained for a minimum of three years.

APPROPRIATE PHYSICAL ENVIRONMENT

NM 11.0 The design and layout of the nuclear medicine service’s physical space allows service delivery to be safe, and efficient for patients and staff.

NM 11.1 Nuclear medicine procedures are performed in an environment designed to ensure patient safety.
NM11.1.1 M ☐ Therapeutic procedures are performed in locations with consideration for radiation safety precautions.

Appropriate space is available for the following functions:
NM11.1.2 ☐ “Hot” and “Cold” patient waiting areas.
NM11.1.3 ☐ “Hot” and “Cold” patient washrooms.
NM11.1.4 ☐ radiopharmacy lab.
NM11.1.5 ☐ cell labeling.
NM11.1.6 ☐ injection.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.

The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.


SPECIFIC DOCUMENTS REFERENCED


ACCREDITATION STANDARDS 2010

NUCLEAR MEDICINE RADIATION SAFETY

Introduction:
The Nuclear Medicine Radiation Safety section of the Accreditation Standards addresses additional requirements related to:
- Minimizing radiation exposure
- Managing radioactive material

MINIMIZING RADIATION EXPOSURE TO STAFF AND VISITORS

NMRS 1.0  Appropriate measures are in place to prevent unnecessary radiation exposure to staff and visitors.

NMRS 1.1  Imaging staff is aware of the risks of ionizing radiation and manage the risks appropriately.

NMRS1.1.1  The nuclear medicine service has a radiation safety officer responsible for overseeing radiation protection.

NMRS1.1.2  There are documented policies and procedures for radiation safety and for handling radioactive materials.

Guidance: A radiation safety manual is available in either hard copy or electronic format.

NMRS1.1.3  Policies and procedures are in place to protect pregnant staff.¹

NMRS1.1.4  Written guidelines are in place for individuals assisting the patient (e.g. holding or assisting during examinations).

NMRS1.1.5  Staff refrain from eating or drinking in radiation-use areas.

NMRS1.1.6  Staff adhere to the practice of ALARA (As Low As Reasonably Achievable) along with the principles of time, distance and shielding in order to minimize radiation exposure.

NMRS1.1.7  There is documentation to support how the facility identifies and deals with the hazards associated with ionizing radiation.

¹ Enhancing public safety through excellence in diagnostic medicine accreditation
NMRS 1.2 Radiation exposures to staff members are monitored through the use of personal dosimeters.

NMRS1.2.1 M All nuclear medicine staff, together with personnel (e.g. nurses) who routinely participate in radiation procedures, and others, likely to receive a radiation dose in excess of 1/20th (action level) of the dose limit to radiation workers specified are declared radiation workers and their radiation exposures are monitored with the use of a personal dosimeter.

NMRS1.2.4 M If extremities are likely to be exposed to significantly higher doses; additional dosimeters are worn at those locations on the body.

NMRS1.2.5 M Employees return personal dosimeters to the employer for submission to the dosimetry service provider for analysis. 

Note: It is the responsibility of the dosimetry service provider to submit the results to the National Dose Registry (Health Canada), as well as to the employer.

NMRS1.2.6 M Results of personal dosimeters are reviewed and monitored by a radiation safety officer or designate on a regular basis.

NMRS1.2.7 M An investigation is initiated when a high reading is reported. 

Guidance: A reading higher than usually recorded.

NMRS1.2.8 M Results are posted in the imaging service.

NMRS1.2.9 M All staff members are responsible to sign their posted results.

NMRS 1.3 Radiation warning signage is clearly visible to alert patients, staff and visitors of the risks associated with radiation.

NMRS1.3.1 M Radiation warning labels are posted at the entrance of each room that may contain a source of ionizing radiation.

NMRS1.3.2 M Access control signs (e.g. authorized personnel only) are posted in the areas where radioactive materials are stored and handled.

NMRS 1.4 Education and/or instruction is provided to patients, staff and visitors on the hazards of radiation.

NMRS1.4.1 M Radiation safety education is provided to nuclear medicine staff upon hire and on a continuous basis.

NMRS1.4.2 M Education is provided on the hazards of radiation and the appropriate means of reducing exposures to all relevant nursing and ancillary staff.

NMRS1.4.3 M Instructions on radiation precautions for therapeutic procedures and/or diagnostic procedures are given to patients and their families.

NMRS1.4.4 M Instruction is provided to patients traveling across international borders.
MINIMIZING RADIATION EXPOSURE TO PATIENTS

NMRS 2.0  Appropriate measures are in place to prevent unnecessary radiation exposure to patients.

NMRS 2.1  Mechanisms are in place to prevent unnecessary radiation to patients.
  NMRS2.1.1  M  There is signage posted, at a minimum, in the reception and patient changing/waiting areas that is clearly visible to alert women who may be pregnant to notify the technologist.

NMRS 2.2  Procedures are in place to protect female patients of childbearing age.
  NMRS2.2.1  M  Before performing examinations on females of child bearing age (11-55 years), the patient is asked whether there is any chance that they may be pregnant.
  NMRS2.2.2  M  If an examination is requested on a pregnant or potentially pregnant patient, there are documented procedures on how to proceed with the examination request.

MANAGING RADIOACTIVE MATERIALS

NMRS 3.0  Radioactive materials are safely managed.

NMRS 3.1  Radiation safety is ensured when staff members handle radioactive materials.
  NMRS3.1.1  M  The nuclear medicine service operates in compliance with the Canadian Nuclear Safety Commission (CNSC) regulations for medical diagnostic and/or therapeutic use of radioisotopes.
    Guidance: Compliance includes but is not limited to a current CNSC license and the storage, handling, disposal of radioactive material, etc.

Protection is made available for the handling of radioactive materials by staff that includes:
  NMRS3.1.2  M  lead aprons and tongs.
    Guidance: The facility may also provide free standing lead barriers as a means for personal protection.
  NMRS3.1.3  M  lead glass dose drawing station.
  NMRS3.1.4  M  lead syringe shields.
  NMRS3.1.5  M  lead bricks for the radiopharmaceutical lab.
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#### NMRS 3.2
Radioactive materials are safely and securely stored.

| NMRS3.2.1 | M ☐ Radioactive materials are shielded. |
| NMRS3.2.2 | M ☐ Volatile radiopharmaceuticals are stored in an operating fume hood. |
| NMRS3.2.3 | M ☐ Fume hoods (laminar and vented) are annually certified. |
| NMRS3.2.4 | M ☐ Radioactive material storage and decay areas are locked when not under the supervision of nuclear medicine personnel. |
| NMRS3.2.5 | M ☐ There is a protocol for reporting the theft or loss of radioactive materials based on types and amounts of materials and any risk to the public. |

#### NMRS 3.3
Transportation of radioactive and hazardous materials complies with federal regulations.²

| NMRS3.3.1 | M ☐ A nuclear medicine service that ships or receives biohazardous or radioactive materials has staff certified in the Transportation of Dangerous Goods (TDG). |
| NMRS3.3.2 | M ☐ Shipping and receiving is handled or directly supervised by a person having obtained TDG certification. |

Staff is knowledgeable about:

| NMRS3.3.3 | M ☐ classification, shipping names, and the use of schedules 1, 2, and 3. |
| NMRS3.3.4 | M ☐ documentation, safety marks, certification safety marks and safety standards. |
| NMRS3.3.5 | M ☐ emergency response assistance plan and reporting requirements. |
| NMRS3.3.6 | M ☐ safe handling, nature and characteristics. |
| NMRS3.3.7 | M ☐ proper equipment use. |
| NMRS3.3.8 | M ☐ emergency measures. |
| NMRS3.3.9 | M ☐ Radioactive shipments are delivered directly to the Nuclear Medicine department and not left unattended. |
| NMRS3.3.10 | M ☐ 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. |

#### NMRS 3.4
Staff members ensure the appropriate monitoring and decontamination of radioactivity.

| NMRS3.4.1 | M ☐ Staff routinely monitor their hands for possible contamination; at a minimum, hands are monitored prior to leaving the radiopharmacy lab. |
| NMRS3.4.2 | M ☐ Area surveys and wipe tests are performed, that include tolerance limits and response to trigger levels. |
| NMRS3.4.3 | M ☐ There is a sealed source wipe/leak testing protocol for semi-annual testing. |
| NMRS3.4.4 | M ☐ There is a protocol for reporting excessive radiation exposures (e.g. spills, to staff or public) including trigger levels and reporting requirements. |
| NMRS3.4.5 | M ☐ Radiation monitoring devices are readily available. |
| NMRS3.4.6 | M ☐ A thyroid screening program is in place for staff who handle open sources of volatile radiiodine.³ |
NMRS 4.0  Radioactive hazards are effectively assessed on an ongoing basis to improve the safety of the service.

NMRS 4.1  There are established processes to continually assess hazards and incidents to improve the safety of the service that includes:

NMRS4.1.1  M an assessment of radiopharmaceutical administration errors and identification for improvements.

NMRS4.1.2  M an assessment of radioactive contamination reports and identification for improvements.

NMRS 4.2  Procedures are in place for the safe disposal of radioactive materials.

NMRS4.2.1  M Radioactive materials are disposed of in accordance with Canadian Nuclear Safety Commission (CNSC) regulations.

NMRS4.2.2  M Records of radioactive waste disposal are maintained in accordance with Canadian Nuclear Safety Commission (CNSC) regulations.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.


WorkSafe BC, OH&S Regulations, Part 7, Division 3 Radiation Exposure.


SPECIFIC DOCUMENTS REFERENCED

1 WorkSafe BC, OH&S Regulations, Part 7, Division 3 Radiation Exposure, 7.21 Reproductive Hazards. Retrievable from: http://www2.worksafebc.com/publications/OHSRegulation/Part7.asp#SectionNumber:7.20


ACCREDITATION STANDARDS 2010

BONE DENSITOMETRY

The Bone Densitometry Accreditation Standards are used in conjunction with the Global Modality Accreditation Standards.

Introduction:
In addition to the Global Modality Accreditation Standards, the modality specific Accreditation Standards for Bone Densitometry provide additional mandatory requirements and best practices for accreditation in the modality of Bone Densitometry.

The Bone Densitometry section of the Accreditation Standards address additional requirements related to:
- Patient preparation
- Imaging procedures
- Medical records
- Interpretation and reports
- Equipment

Definitions:
Dual-energy x-ray absorptiometry (DXA) is the fundamental technology for testing of bone mineral density (BMD). These standards pertain to central DXA systems.

BMC refers to bone mineral content\(^1\).

BMD refers to bone mineral density\(^1\).
PATIENT PREPARATION

BD 2.0 Patients are appropriately prepared for the examination being performed.

BD 2.2 Pre-examination information is collected and assessed prior to commencing the examination.

*See also Global Modality Accreditation Standards GM 2.2.*

BD2.2.1 M Pertinent medical history (e.g. family history, prior fragility fractures, prior bone trauma/fractures, surgery, chronic illness, and relevant medications) is obtained and documented.

*Note: See sample patient questionnaire.*

Examination contraindications are assessed and documented including:

BD2.2.2 recent barium (for spine measurements) or radionuclide studies are considered in scheduling.

BD2.2.3 severe arthritic or fracture deformity or other degenerative changes at the site to be measured.

BD2.2.4 radio-opaque implants in the measurement area, most commonly the hip.

BD2.2.5 M Weight is assessed to ensure that it is within manufacturer limits.

BD2.2.6 A qualified physician is involved in assessing any contraindications.

BD2.2.7 When prior radiographs of anatomic areas are available, these are reviewed to determine if specific sites are to be excluded from the analysis.

BD2.2.8 M Patient height and weight are accurately measured and documented.

*Guidance: Height and weight are to be measured at the facility. Height and weight reported by the patient or measurements provided by other medical practitioners are not to be used, except in exceptional circumstances where it is not possible to carry out the measurements (e.g. the patient cannot stand).*

IMAGING PROCEDURES

BD 3.0 Standard protocols result in examinations appropriate for their intended use in clinical decision-making.

BD 3.1 There is a comprehensive process in place for protocol adoption and development.

*See also Global Modality Accreditation Standards GM3.1.*

BD3.1.1 M Protocols are reviewed every 1-3 years by qualified individual(s).
### ACCREDITATION STANDARDS
#### BONE DENSITOMETRY

#### 3.2 Protocols contain all the information necessary to perform the examination.

<table>
<thead>
<tr>
<th>BD</th>
<th>3.2</th>
<th>Protocols contain all the information necessary to perform the examination. Protocol information includes, but is not limited to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD3.2.1</td>
<td>M</td>
<td>the equipment/supplies needed.</td>
</tr>
<tr>
<td>BD3.2.2</td>
<td>M</td>
<td>a description of patient positioning.</td>
</tr>
<tr>
<td>BD3.2.3</td>
<td>M</td>
<td>the acquisition and processing parameters.</td>
</tr>
</tbody>
</table>

**Guidance:** The protocols are to include parameters such as region of interest, bone tracing, rejection criteria, additional sites as required, and scan speed.

#### 3.3 Examinations are performed following established protocols.

<table>
<thead>
<tr>
<th>BD</th>
<th>3.3</th>
<th>Examinations are performed following established protocols.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD3.3.1</td>
<td>M</td>
<td>Protocols are readily available to staff performing the examination.</td>
</tr>
</tbody>
</table>

**Intent:** Protocols are in place for the measurement of skeletal sites, such as the lumbar spine and the hip (proximal femur). If either the lumbar spine or hip is not available or invalid because of artifact, the non-dominant forearm is to be measured. The dominant side can be measured if the non-dominant side is invalid or not available. Two skeletal sites are typically measured; however, this is not always practical with every patient.

#### 3.4 Protocols are in place for serial bone densitometry monitoring.

<table>
<thead>
<tr>
<th>BD</th>
<th>3.4</th>
<th>Protocols are in place for serial bone densitometry monitoring.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD3.4.1</td>
<td></td>
<td>Serial examinations are performed using the same DXA system as used for previous examinations or in situations where equipment has been changed or replaced, serial comparisons are made after equipment cross-calibration has been performed.</td>
</tr>
<tr>
<td>BD3.4.2</td>
<td></td>
<td>Examination imaging parameters are replicated for serial examinations where there is no significant patient weight loss or gain.</td>
</tr>
<tr>
<td>BD3.4.3</td>
<td>M</td>
<td>Precision assessment is done according to standard protocols.</td>
</tr>
</tbody>
</table>

**Intent:** Precision assessment determines the facility precision error and least significant change (LSC) for each skeletal site used for serial monitoring. If the DXA facility has more than one technologist, an average precision error combining data from all technologists is to be used to establish precision error and LSC for the facility. Each technologist is to perform a precision assessment after basic scanning skills have been learned (e.g. applications training) and after having performed approximately 100 patient scans). A repeat precision assessment is to be done if a new DXA system is installed or if a technologist’s skill level has changed. For more information on precision assessments, including how to perform and calculate a precision assessment, and minimum acceptable precision values see the associated reference: The International Society for Clinical Densitometry 2007 Official Positions.
**ACCREDITATION STANDARDS**

**BONE DENSITOMETRY**

**BD 3.5**  
Images are reviewed for diagnostic quality before the patient is released.

*Intent:* The process to accept or reject examinations includes verification of consistent and proper patient positioning using the appropriate devices issued by the manufacturer. Comfort devices should ensure proper positioning but should not appear in the field of view. When significant discrepancy is present between two areas measured, (e.g. spine and hip, with no evident explanation from the patient history) DXA examinations or plain radiographic correlation, additional DXA acquisitions of other anatomic sites may be considered.

Image review ensures:

- BD3.5.1 M the anatomic area of interest is in the scan field of view.
- BD3.5.2 M the presence of artifacts and motion does not impact the diagnostic quality.
- BD3.5.3 M consistent labeling of regions of interest.

**MEDICAL RECORD**

**BD 7.0**  
The medical record is current, accurate and contains quality diagnostic images and relevant examination details.

**BD 7.1**  
Examinations are labeled in a standardized way that allows for proper patient identification and annotations that includes:

*See also Global Modality Accreditation Standards GM 7.1.*

- BD7.1.1 M version of software.
  
  *Note: Some software may not have the functionality to display version of software.*

**BD 7.2**  
Comprehensive examination details are recorded in the medical record that includes:

*See also Global Modality Accreditation Standards GM 7.2.*

- BD7.2.1 M pregnancy status.
- BD7.2.2 M menopausal status.
  
  *Guidance: Further information may include date of commencement of menopause or date of Last Menstrual Period (LMP) when known by the patient.*

- BD7.2.3 M pertinent medical history (e.g. family history, prior fragility fractures, prior bone trauma/fractures, surgery, chronic illness, and relevant medications).

- BD7.2.4 M measured height and weight at the time of the examination.
  
  *Note: Weight changes in excess of ± 5kg may impact the determination or accuracy of bone density.*
INTERPRETATION AND REPORTS

Introduction:
The reporting standards apply to both adult and pediatric patients. The contents of the report will differ depending on whether it is an adult or pediatric study, and whether it is a first-time or serial (follow-up) study. The pediatric population is defined as individuals under age 18 years. Manufacturer software, however, may not provide T-scores between 18 and 20 years; in this circumstance it is acceptable to provide Z-scores and to use the pediatric approach to reporting.

Definitions:
- **T-score** refers to the number of standard deviations above (+) or below (-) mean peak young-adult bone density.
- **Z-score** refers to the number of standard deviations above (+) or below (-) the mean density for an individual of that age and sex.

Least Significant Change (LSC) is the amount by which one BMD value must differ from another in order for the difference to be statistically significant at a 95% level of confidence.

BD 8.0 Diagnostic reports are in a standardized format that provides comprehensive and necessary information for clinical decision-making.

See also Global Modality Accreditation Standards GM 8.1.

BD 8.2 Reports contain sufficient information to assist in diagnosis.

See also Global Modality Accreditation Standard GM8.2.1.

The body of a first-time and/or serial (follow-up) report includes the following:

**BD8.2.1** M machine identifier.

**Guidance:** The DXA brand and model are examples of machine identifiers.

**BD8.2.2** M diagnostic category (e.g. normal, reduced, low bone mass, osteoporosis, etc.).

**Guidance:** The diagnostic category is based on the lowest T-score. If a total body scan is performed, the total body BMD T-score may be used. For Pediatric patients the diagnostic category is based on the lowest adjusted Z-score from the results for the lumbar spine and total body using either BMC or BMD, at the discretion of the reporting physician. The T-score is not to be used in pediatric reporting.

**BD8.2.3** M a statement about fracture risk.

**Guidance:** The absolute fracture risk is to be included for men and women 50 years of age and older when relevant history (e.g. fragility fracture, glucocorticoid history) is available.

**Note:** See, as an example, Tables 3 and 4 from the 2005 CAR Clinical Practice Guidelines.

**BD8.2.4** M BMD data.

**Guidance:** For adult reporting the BMD data includes the BMD in g/cm$^2$, the BMD T-score and the reference database and version used to derive T-scores. For pediatric reporting the BMD data includes the BMD in g/cm$^2$, the BMD Z-score, adjusted BMD Z-score, Bone Mineral Content (BMC) in g, BMC Z-score, adjusted BMC Z-score, and the reference database and version used to derive the Z-scores.
ACCREDITATION STANDARDS
BONE DENSITOMETRY

BD8.2.5 M potential limitations.

BD8.2.6 M the impression (e.g. conclusion or diagnosis) section of the report.

Guidance: A narrative section on interpretation and implications of BMD results is provided. This is not meant to be a restatement of data. Recommendations for the necessity and timing of the next BMD study, as appropriate.

BD8.2.7 M definitions.

Guidance: Any terminology or abbreviations (e.g. T-score, Z-score, fracture risk, etc.) used in the report are defined.

The body of a serial (follow-up) report also includes the following:

BD8.2.8 M changes in density

Guidance: The description of density change is to include the absolute density change in g/cm² and/or the percentage change. The same reference population database is to be used for serial studies when possible. If the reference database must be changed, this is noted in the report.

BD8.2.9 M least significant change (LSC) and statistical significance.

Guidance: Each facility must determine precision error using the LSC methodology and use this value when determining statistical significance. Statistical significance is to be reported for each BMD skeletal site comparison, indicating whether the difference is considered significant at a 95% level of confidence. The LSC is stated in absolute values (g/cm²) for each skeletal site for which change is reported.

BD 8.3 A timely and accurate final report is issued for all examinations.

See also Global Modality Accreditation Standards GM8.3.

BD8.3.1 M If DXA computer generated reports are issued, the DXA software is validated to ensure the accuracy of the reported data.
EQUIPMENT

BDES 1.0  Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

BDES 1.4  The bone densitometry equipment ensures diagnostic quality examinations.

BDES1.4.1  M  The DXA equipment provides a reference data base of bone density values for normal young adults, and age and sex matched control populations. Intent: The reference values in the database are applicable to the purchased densitometer. The reference values may be matched for weight and body mass index, if available.

BDES1.4.2  M  The service has a height measuring device with accuracy of ± 0.5cm. See also Bone Densitometry Accreditation Standard BDES 3.1.5.

BDES1.4.3  M  The service has a device to measure patient weight with an accuracy of ± 1kg. See also Bone Densitometry Accreditation Standard BDES 3.1.5.

BDES1.4.4  M  When necessary, cross-calibration is performed according to standard protocols. Intent: When changing hardware, but not the entire system, or when replacing a system with the same technology (e.g. manufacture and model), or when changing an entire system to one made by the same manufacturer using a different technology or when changing to a system made by a different manufacturer, cross-calibration is performed according to ISCD procedures. If a cross-calibration assessment is not performed, no quantitative comparison to the prior machine can be made. Also, it is not possible to quantitatively compare BMD or to calculate a LSC between facilities without cross-calibration.

BDES 2.0  Equipment testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES2.1.

BDES 2.1  Acceptance testing is performed after purchase and prior to clinical use of equipment.

See also Radiation Safety Accreditation Standards RS4.1.1 Radiation Emitting Devices (RED) regulations. As part of acceptance testing procedures there is verification of compliance to RED regulations for diagnostic X-ray equipment, Part XII (RS 4.1.1). During acceptance testing there is a process for:

BDES2.1.1  M  initial inspection and inventory.
BDES2.1.2  M  inspection of documentation.

Acceptance testing includes visual and functional testing of the:

BDES2.1.3  M  mechanical properties.
BDES2.1.4  M  safety systems.

Testing includes evaluation of the:

BDES2.1.5  radiation scatter.
BDES2.1.6  radiation dose.
BDES  3.0  Quality Assurance programs are established to ensure the attainment of intended quality.

BDES  3.1  Quality Control procedures are established and used to monitor performance.

See also Equipment and Supplies Accreditation Standards DES3.0.

BDES3.1.1  Procedures are completed before the first patient measurement of the day.

BDES3.1.2  Procedures are assessed immediately upon completion according to the guidelines provided by the manufacturer.

QC procedures include:

BDES3.1.3  daily accuracy and precision checks using a calibration phantom.

Guidance: Refer to the DXA system manufacturer guidelines for calibration. Some systems require calibration as part of daily QC using a phantom. For other systems, continuous calibration is achieved automatically.

BDES3.1.4  system performance verification using a spine phantom three times a week or every day that patients are examined.

BDES3.1.5  The height and weight measuring devices are tested and monitored monthly. See also Bone Densitometry Accreditation Standards BDES1.4.2 and BDES 1.4.3.

BDES3.1.6  A lumbar spine phantom, provided by the DAP, is measured twice a year in order to verify DXA function over a clinically relevant range of bone mineral densities.

BDES  5.0  Examinations are retrievable in a timely manner.

Intent: This standard is to be addressed by those facilities that do not archive to PACS and have a stand-alone digital archival.

BDES  5.1  Processes are in place to ensure images and measurements are readily accessible to the service, clients and patients.

BDES5.1.1  Digital back-up is performed daily or at least three times per week.

BDES5.1.2  A second copy of examination data is securely stored in a separate physical location.
REVIEWED DOCUMENTS

The following documents were reviewed in the development of this section of the accreditation standards:


College of Physicians and Surgeons of Alberta, Diagnostic Imaging, Standards and Guidelines, March 2010.

The Royal Australian and New Zealand College of Radiologists: Standards of Practice of Diagnostic and Interventional Radiology, Version 9.1.

SPECIFIC DOCUMENTS REFERENCED


Preamble

This glossary has been adapted from one provide by the International Society for Quality in Health Care (ISQua). Some of ISQua’s definitions have been altered to better reflect the needs of diagnostic facilities in British Columbia. Some definitions have been imported from the Institute of Medicine and the Clinical Laboratory Standards Institute.

Accreditation

A recognition of the achievement of accreditation standards by a diagnostic facility or organization, demonstrated through an independent external peer assessment of that organization’s level of performance in relation to the Diagnostic Accreditation Program’s standards, criteria and criterion descriptors.

Accreditation body

The organization responsible for the accreditation program and the granting of accreditation status.

Access

Ability of clients or potential clients to obtain required or available services when needed within an appropriate time.

Accountability

Responsibility and requirement to answer for tasks or activities. This responsibility may not be delegated and must be transparent.
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Diagnostic Imaging

Appropriateness
The degree to which service is consistent with requirements and current best practice.

Assessment
Process by which the characteristics and needs of clients, groups or situations are evaluated or determined so that they can be addressed. The assessment forms the basis of a plan for service or action.

Audit
A systematic examination and review to determine whether actual activities and results comply with planned arrangements.

Best practice
An approach that has been shown to produce superior results, selected by a systematic process, and judged as exemplary, or demonstrated as successful. It is then adapted to fit a particular organization.

Clients
A group or an individual who access the services of, or information from the diagnostic facility. Client groups may include referring health care professionals, the patient’s family, community, insurers and other third party payers, employers, and patient advocacy groups.

Community
Collectivity of individuals, families, groups and organizations that interact with one another, cooperate in common activities and solve mutual concerns, usually in a geographic locality or environment.

Competence
Guarantee that an individual’s knowledge and skills are appropriate to the service provided and assurance that the knowledge and skill levels are regularly evaluated.

Complaint
Expression of a problem, an issue, or dissatisfaction with services that may be verbal or in writing.

Complementary
Services or components that fit with each other, or supplement one another, to form more complete services.
Confidentiality
Guaranteed limits on the use and distribution of information collected from individuals or organizations.

Consent
Voluntary agreement or approval given by a client.

Continuity
The provision of coordinated services within and across programs and organizations, and over time.

Contract
Formal agreement that stipulates the terms and conditions for services that are obtained from, or provided to, another organization. The contract and the contracted services are monitored and coordinated by the organization and comply with the standards of the government and the organization.

Contracted Service Provider
Contracted service providers include any vendor, contractor, or supplier that provides services. Examples of contracted service providers could include housekeeping services, preventative maintenance providers, referred out diagnostic services and consultants.

Coordination
The process of working together effectively with collaboration among providers, organizations and services in and outside the organization to avoid duplication, gaps, or breaks.

Credentialing
The process of assessing and attesting to an individual’s knowledge, skills, and competence and their compliance with specific requirements.

Criterion
Specific step to be taken, or activity to be done, to fulfill a standard. In the DAP document, criterion are indicated by a number such as x.1, x.2, x.3...)

Criterion Descriptor
A specific activity used to rate a criterion. In the DAP Standards, descriptors are indicated by checkboxes.
Culture
A shared system of values, beliefs and behaviors.

Customers
The patients/clients of a client organization. Internal customers/staff of the organization.

Data
Facts from which information can be generated.

Document control system
A planned system for controlling the release, change, and use of important documents within the organization, particularly policies and procedures. The system requires each document to have a unique identification, to show dates of issue and updates and authorization. Issue of documents in the organization is controlled and all copies of all documents are readily traceable and obtainable.

Education
Systematic instructions and learning activities to develop or bring about change in knowledge, attitudes, values or skills.

Effectiveness
The degree to which services, interventions or actions are provided in accordance with current best practice in order to meet goals and achieve optimal results.

Efficiency
The degree to which resources are brought together to achieve results with minimal waste, re-work and effort.

Ethics
Standards of conduct that are morally correct.

Evaluation
Assessment of the degree of success in meeting the goals and expected results (outcomes) of the organization, services, programs or clients.
Evidence
Data and information used to make decisions. Evidence can be derived from research, experiential learning, indicator data and evaluations. Evidence is used in a systematic way to evaluate options and make decisions.

Follow-up
Processes and actions taken after a service has been completed.

Form
A paper or electronic document which requests services or captures information.

Goals
Broad statements that describe the outcomes an organization is seeking and provide direction for day-to-day decisions and activities. The goals support the mission of the organization.

Governance
The function of determining the organization’s direction, setting objectives and developing policy to guide the organization in achieving its mission, and monitoring the achievement of those objectives and the implementation of policy.

Governing body
Individuals, group or agency with ultimate authority and accountability for the overall strategies, directions and modes of operation of the organization. Also known as the council, board, board of commissioners, etc.

Guidelines
Principles guiding or directing action.

Health professionals
Medical, nursing or allied health professional staff who provide clinical treatment and care to clients, having membership of the appropriate professional body and, where required, having completed and maintained registration or certification from a statutory authority.

Human resources
The personnel requirements of the organization
Human resources file
The collection of information about a staff member covering personnel issues such as leave, references, performance appraisals, qualifications, registration and employment terms.

Incidents
Events that are unusual, unexpected, may have an element of risk, or that may have a negative effect on clients, groups, staff, or the organization.

Indicator
Performance measurement tool, screen or flag that is used as a guide to monitor, evaluate and improve the quality of services. Indicators relate to structure, process and outcomes.

Information
Data that is organized, interpreted and used. Information may be in written, audio, video or photograph form.

Information systems
Systems for planning, organizing, analyzing and controlling data and information, including both computer-based and manual systems.

Leadership
Ability to provide direction and cope with change. It involves establishing a vision, developing strategies for producing the changes needed to implement the vision; aligning people; and motivating and inspiring people to overcome obstacles.

Licensure
Process by which a government authority grants permission to an individual practitioner or healthcare organization to operate or to engage in an occupation or profession.

Management
The group or individual responsible for, or the activity of, setting targets or goals for the future through planning and budgeting, establishing processes for achieving those targets and allocating resources to accomplish those plans. Ensuring daily operation of the diagnostic setting. Ensuring that plans are achieved by organizing, staffing, controlling and problem-solving. Management could include: directors, managers and department heads as well as charge and chief technical staff.
**Mandatory**

A compulsory descriptor identified in the DAP standards. Unfulfilled mandatory descriptors will result in immediate recommendations with specified time frames for follow-up.

**Method Validation**

The process of proving that an analytical method is acceptable for its intended purposes.

**Mission**

A broad written statement in which the organization states what it does and why it exists. The mission sets apart one organization from another.

**Need**

Physical, mental, emotional, social or spiritual requirement for well-being. Needs may or may not be perceived or expressed by those in need. They must be distinguished from demands, which are expressed desires, not necessarily needs.

**Objective**

A target that must be reached if the organization is to achieve its goals. It is the translation of the goals into specific, concrete terms against which results can be measured.

**Organization**

Comprises all sites/locations under the governance of, and accountable to, the governing body/owner(s).

**Operational plan**

The design of strategies, which includes the processes, actions and resources to achieve the goals and objectives of the organization.

**Orientation**

The process by which staff become familiar with all aspects of the work environment and their responsibilities.

**Partners**

The organizations that the organization works and collaborates with to provide complementary services.
Partnerships
Formal or informal working relationships between organizations where services may be developed and proved jointly, or shared.

Peer review
A process whereby the performance of an organization, individuals or groups are evaluated by members of similar organizations or the same profession or discipline and status as those delivering the services.

Performance appraisal
The continuous process by which a manager appraisal and a staff member review the staff member’s performance, set performance goals, and evaluate progress towards these goals.

Philosophy
A statement of principles and beliefs made by the organization by which it is managed and delivers services.

Policy
A documented statement of overall intent and direction by those in the organization, endorsed by management.

Procedures
Written specified instructions conveying the approved and recommended steps for a particular act or series of acts.

Processes
Series of interrelated activities that involve multiple steps or engage multiple people.

Qualified
Having the credentials for, being professionally and legally prepared and authorized to perform specific acts.

Qualitative
Data and information expressed with descriptions and narratives, a method that investigates the experience of users through observation and interviews.
Quality
The degree to which health service for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.  

Quality Control
The monitoring of output to check if it conforms to specifications or requirements and action taken to rectify the output. Quality Control helps to ensure the accuracy and reproducibility of procedures.

Quality improvement
A process that seeks to meet client’s needs and expectations by using a structured approach to selectively identify areas to improve, and that improves all aspect of the services, including outcomes of service to patients and clients.

Quality plan
The current action plan for meeting service quality requirements.

Quantitative
Data and information that is expressed in numbers and statistics, a method that investigates phenomena with measures.

Recruitment and selection
Processes used to attract, choose and appoint qualified staff and surveyors.

Research
A non-diagnostic process which contributes to an existing body of knowledge through investigation, aimed at the discovery and interpretation of facts.

Results (Outcomes)
The outputs, values, reports and interpretations of tests, procedures or examinations.

Rights
Something that can be claimed as justly, fairly, legally or morally one’s own. A formal description of the services that clients can expect and demand from an organization.

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1 Institute of Medicine
Risk
Chance or possibility of danger, loss or injury. This can relate to the health and well-being of staff and the public, property, reputation, environment, organizational functioning, financial stability, market share and other things of value.

Risk management
A systematic process of identifying, assessing and taking action to prevent or manage clinical, administrative, property and occupational health and safety risks in the organization.

Safety
The degree to which the potential risk and unintended results are avoided or minimized.

Scope
The range and type of services offered by the organization and any conditions or limits to service coverage.

Services
Products of the organization delivered to clients, or units of the organization that deliver products to clients.

Staff
Individuals who contribute to the delivery of the diagnostic service. This includes both employees of the organization as well as independent contractors.

Stakeholder
Individuals, organizations or groups that have an interest or share in services.

Standard
An achievable level of performance against which actual performance is compared. In DAP documents standards are identified as whole numbers (i.e. 1.0, 2.0, 3.0...).

Strategic plan
A formalized plan that establishes the organization’s overall goals and that seeks to position the organization in terms of its environment.
Supplier
Suppliers include any vendors that provide goods. Goods are any items purchased such as supplies, equipment, devices or reagents.

Survey
External peer assessment which measures the performance of the diagnostic service against an agreed set of standards, criteria and criterion descriptors.

Surveyor
External peer reviewer, assessor of diagnostic service performance against agreed standards.

Values
Principles, beliefs or statements of philosophy that guide behavior and that may involve social or ethical issues.

Vision
Description of what the organization would like to be.