Diagnostic Accreditation Program Accreditation Standards

Relocation Assessment

Diagnostic Imaging

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Accreditation Standards for Relocation Assessment

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HOW TO USE THIS DOCUMENT

All diagnostic services that are relocating to a new address or within their existing building (e.g. facility is rebuilt on the same site) **must** proceed through the relocation assessment process and receive an accreditation award **prior** to service delivery and testing of equipment on people in the new location.

The relocation assessment process includes:

- the facility/service completing and submitting documentation that outlines the service profile, equipment, key individuals and their related qualifications, and other information as requested
- a DAP accreditation officer reviewing the submitted documentation and conducting an on-site visit of the new facility

During the relocation assessment process, the new facility is assessed to a partial selection of the Diagnostic Accreditation Program (DAP) Accreditation Standards. This document, Accreditation Standards for Relocation Assessment, identifies those standards that will be utilized by the DAP accreditation officer for conducting the relocation assessment. A facility preparing for a relocation assessment is strongly encouraged to review this document in their preparation, and to ensure all mandatory requirements have been fulfilled prior to scheduling the on-site assessment. It is also suggested that the facility reviews the complete, comprehensive set of DAP Accreditation Standards as these documents provide additional guidance and explanations that the facility may find useful.

Evidence of compliance with mandatory requirements is required for the facility to be eligible to receive an accreditation award for the new facility. Mandatory requirements are identified by a bold type **M**.

ACCREDITATION AWARD

All mandatory requirements must be fully implemented for a facility to be eligible for an accreditation award at their new location.

If the new facility is not awarded accreditation, they are not permitted to commence service delivery. Service delivery may continue at the pre-existing location until such time as the new facility has fully implemented all mandatory requirements.

Facilities are encouraged to contact an accreditation specialist at the DAP for more information on proceeding through the relocation assessment process, and to arrange for an accreditation officer to conduct a relocation assessment.

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GOVERNANCE AND LEADERSHIP

LEADERSHIP

DGL2.2	**Responsibility for the clinical oversight of diagnostic 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 through an environment that promotes clinical excellence.*	
DGL2.2.1	**M**	A senior medical leader is appointed with responsibility for the quality and safety of the medical practice within the diagnostic service.
DGL2.2.4	**M**	Administrative and technical leaders are appointed with responsibility for the quality and safety of operational processes and technical operations within the diagnostic service.

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MEDICAL STAFF

DMS1.0 A medical leader is appointed with assigned responsibilities and accountabilities for the diagnostic service.

DMS1.1		The medical leader has responsibility for medically related activities.
		The medical leader:
DMS1.1.6	**M**	• authorizes the implementation of technical/medical operational policies and procedures related to the diagnostic service

Remotely supervised facilities

Intent: Remotely supervised facilities provide services without medical leadership regularly on site. These facilities are typically small and located in remote communities where examination interpretation is performed off-site at a larger facility or hospital.

DMS1.2		Medical leaders must attend the diagnostic service to assess the quality and safety of service.
DMS1.2.1	**M**	At a minimum, for radiology, the medical leader visits the facility prior to assuming responsibility for medical leadership of a new service.
DMS1.2.3	**M**	At a minimum, for mammography, the medical leader visits the facility prior to assuming responsibility for medical leadership of a new service.
DMS1.2.5	**M**	At a minimum, for ultrasound, the medical leader visits the facility prior to assuming responsibility for medical leadership of a new service.
DMS1.2.7	**M**	At a minimum, for echocardiography, the medical leader visits the facility prior to assuming responsibility for medical leadership of a new service.
DMS1.2.9	**M**	At a minimum, for computed tomography, the medical leader visits the facility prior to assuming responsibility for medical leadership of a new service.
DMS1.2.11	**M**	At a minimum, for magnetic resonance imaging, the medical leader visits the facility prior to assuming responsibility for medical leadership of a new service.

DMS1.2.13	**M**	At a minimum, for nuclear medicine, the medical leader, or a delegated nuclear medicine physician, visits the facility prior to assuming responsibility for medical leadership of a new service.
DMS1.2.15	**M**	At a minimum, for bone densitometry, the medical leader visits the facility prior to assuming responsibility for medical leadership of a new service.
DMS1.4	**Logs to record medical leader visits are maintained.**	
DMS1.4.1	**M**	A log is kept to record the visit of the medical leader or delegate to the diagnostic service.
DMS1.4.2	**M**	Recommendations for improvement or required follow-up are recorded in the log.
DMS1.4.3	**M**	The log is signed by the person conducting the visit.

CREDENTIALING AND PRIVILEGING

DMS2.0 Appropriately qualified and competent medical practitioners practise within the diagnostic service.

DMS2.3	**Diagnostic radiology services are provided by qualified physicians.**	
DMS2.3.1	**M**	Physicians providing diagnostic radiology services have the requisite credentials for privileges as outlined in the Provincial Privileging Dictionaries. *Guidance: Diagnostic radiology services are considered core and non-core privileges depending on the relevant specialty and therefore may require further training, experience and demonstrated skill. Refer to http://bcmqi.ca/privileging-dictionaries/ for the requirements to perform diagnostic radiology.*
DMS2.4	**Diagnostic mammography services are provided by qualified physicians.**	
DMS2.4.1	**M**	Physicians providing diagnostic mammography services have the requisite credentials for privileges as outlined in the Provincial Privileging Dictionaries. *Guidance: Diagnostic mammography services are considered core and non-core privileges depending on the relevant specialty and therefore may require further training, experience and demonstrated skill. Refer to http://bcmqi.ca/privileging-dictionaries/ for the requirements to perform diagnostic mammography.*
DMS2.5	**Diagnostic ultrasound services are provided by qualified physicians.**	
DMS2.5.1	**M**	Physicians providing diagnostic ultrasound services have the requisite credentials for privileges as outlined in the Provincial Privileging Dictionaries. *Guidance: Diagnostic ultrasound services are considered core and non-core privileges depending on the relevant specialty and therefore may require further training, experience and demonstrated skill. Refer to http://bcmqi.ca/privileging-dictionaries/ for the requirements to perform diagnostic ultrasound.*

DMS2.8	**Diagnostic echocardiography services are provided by qualified physicians.**	
DMS2.8.1	**M**	Physicians providing diagnostic echocardiography services have the requisite credentials for privileges as outlined in the Provincial Privileging Dictionaries. *Guidance: Diagnostic echocardiography services are considered core and non-core privileges depending on the relevant specialty and therefore may require further training, experience and demonstrated skill. Refer to http://bcmqi.ca/privileging-dictionaries/for the requirements to perform diagnostic echocardiography.*
DMS2.9	**Diagnostic computed tomography (CT) services are provided by qualified physicians.**	
DMS2.9.1	**M**	Physicians providing diagnostic CT services have the requisite credentials for privileges as outlined in the Provincial Privileging Dictionaries. *Guidance: Diagnostic CT services are considered core and non-core privileges depending on the relevant specialty and therefore may require further training, experience and demonstrated skill. Refer to http://bcmqi.ca/privileging-dictionaries/ for the requirements to perform diagnostic CT.*
DMS2.10	**Diagnostic magnetic resonance imaging (MRI) services are provided by qualified physicians.**	
DMS2.10.1	**M**	Physicians providing diagnostic MRI services have the requisite credentials for privileges as outlined in the Provincial Privileging Dictionaries. *Guidance: Diagnostic MRI services are considered core and non-core privileges depending on the relevant specialty and therefore may require further training, experience and demonstrated skill. Refer to http://bcmqi.ca/privileging-dictionaries/ for the requirements to perform diagnostic MRI.*
DMS2.11	**Diagnostic nuclear medicine services are provided by physicians:**	
DMS2.11.1	**M**	Physicians providing diagnostic nuclear medicine services have the requisite credentials for privileges as outlined in the Provincial Privileging Dictionaries. *Guidance: Diagnostic nuclear medicine services are considered core and non-core privileges depending on the relevant specialty and therefore may require further training, experience and demonstrated skill. Refer to http://bcmqi.ca/privileging-dictionaries/ for the requirements to perform diagnostic nuclear medicine.*
DMS2.14	**Diagnostic bone densitometry services are provided by qualified physicians.**	
DMS2.14.1	**M**	Physicians providing diagnostic bone densitometry services have the requisite credentials for privileges as outlined in the Provincial Privileging Dictionaries. *Guidance: Diagnostic bone densitometry services are considered core and non-core privileges depending on the relevant specialty and therefore may require further training, experience and demonstrated skill. Refer to http://bcmqi.ca/privileging-dictionaries/ for the requirements to perform diagnostic bone densitometry.*

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HUMAN RESOURCES

STAFF SELECTION AND RETENTION

DHR2.0 The diagnostic service has procedures in place to recruit and retain qualified and competent staff.

DHR2.1		**The diagnostic service has qualified and competent staff to deliver services.**
		For radiology:
DHR2.1.2	**M**	Technologists providing radiology 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).
		For mammography:
DHR2.1.4	**M**	Technologists providing mammography services are certified with the Canadian Association of Medical Radiation Technologists (CAMRT) and have specialized training in mammography, either through a training curriculum or special courses.
DHR2.1.5	**M**	Mammography technologists responsible for equipment quality control (QC) are specifically trained to perform routine QC tests and record results.
DHR2.1.8	**M**	Medical physicists providing mammography services 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).
		For ultrasound:
DHR2.1.9	**M**	Sonographers providing ultrasound services are certified with Sonography Canada or the American Registry of Diagnostic Medical Sonographers (ARDMS), or are graduates of an accredited training school of ultrasound and are eligible to write the Sonography Canada or ARDMS certification examinations.

DHR2.1.10	**M**	Sonographers performing breast ultrasound are certified with the American Registry of Diagnostic Medical Sonographers (ARDMS) in breast ultrasound (RDMS(BR)). *Intent: Technologists that exclusively perform breast ultrasound (e.g. cross-trained mammography technologists) must either be certified with ARDMS or are graduates of an accredited training school of ultrasound and are in the process of writing their ARDMS certification.*
DHR2.1.11	**M**	Sonographers performing vascular imaging (e.g. carotids, peripheral vascular, abdominal vascular imaging, etc.) are certified with ARDMS in Vascular Imaging (Registered Vascular Technologist (RVT)). *Guidance: Technologists that exclusively perform vascular ultrasound (e.g. technologists working within a vascular laboratory) must either be certified with ARDMS or are graduates of an accredited training school of ultrasound and are in the process of writing their ARDMS certification.*
		For echocardiography:
DHR2.1.12	**M**	Cardiac sonographers providing TTE and/or TEE services have obtained certification in adult and/or pediatric echocardiography from the Sonography Canada or the American Registry of Diagnostic Medical Sonographers (ARDMS).
		For computed tomography (CT):
DHR2.1.13	**M**	Technologists providing CT services are certified with the Canadian Association of Medical Radiation Technologists (CAMRT) and have either completed an advanced specialty program in Computed Tomography or an equivalent combination of education, training and experience.
DHR2.1.16	**M**	CT technologists performing CT colonography have completed continuing education courses or an equivalent combination of in-house education and training on the equipment and techniques used to perform the examination.
DHR2.1.17	**M**	Medical physicists providing CT services are certified in Diagnostic Radiological Physics by the Canadian College of Physicists in Medicine (CCPM), or the American Board of Radiology (ABR), or the American Board of Medical Physics (ABMP).
		For magnetic resonance imaging (MRI):
DHR2.1.18	**M**	Technologists providing MRI services are certified with the Canadian Association of Medical Radiation Technologists (CAMRT) in MRI (RTMR).
DHR2.1.20	**M**	Medical physicists providing MRI services are certified in MRI by the Canadian College of Physicists in Medicine (CCPM), or the American Board of Radiology (ABR), or the American Board of Medical Physics (ABMP), or are MRI scientists with a graduate degree in a physical science involving nuclear MR (NMR) or MRI and possess a minimum of three years of documented experience in a clinical MRI environment.

		For nuclear medicine:
DMS2.1.21	**M**	Technologists providing nuclear medicine services are certified with the Canadian Association of Medical Radiation Technologists (CAMRT), or are graduates of an accredited training school of nuclear medicine and are eligible to write their CAMRT certification examinations.
DMS2.1.23	**M**	Medical physicists providing nuclear medicine services are certified in Nuclear Medicine Physics by the Canadian College of Physicists in Medicine (CCPM), or the American Board of Radiology (ABR), or the American Board of Medical Physics (ABMP). *Guidance: Specific training and experience in CT physics and CT equipment is obtained when SPECT/CT hybrid systems are used.*
		For bone densitometry:
DMS2.1.24	**M**	Technologists providing bone densitometry services are certified with the Canadian Association of Medical Radiation Technologists (CAMRT), or are graduates of an accredited training school of Radiology or Nuclear Medicine and are eligible to write their CAMRT certification examinations.
DMS2.1.25	**M**	Bone densitometry technologists have obtained 12 CME/CE Category 1/A credits in bone densitometry or have current or previous CBDT or CDT certification with International Society for Clinical Densitometry (ISCD).

STAFF ORIENTATION AND TRAINING

DHR5.0 Orientation, training and continuing education for the safe provision of quality diagnostic services is provided.

DHR5.2		**Orientation and ongoing training is provided to existing staff to uphold the quality and safety of the diagnostic service.**
DHR5.2.1	**M**	Orientation and training is provided to existing staff in response to changing roles, technology, competency demands, laws and regulations or after an extended absence.
		Existing staff are provided with ongoing training or orientation in: *Intent: The frequency of ongoing training and re-orientation must be defined by the diagnostic service. The interval should be appropriate for the duties and responsibilities of the each staff member.*
DHR5.2.3	**M**	• imaging system and ancillary equipment use, maintenance and safety features

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GENERAL SAFETY

MANAGEMENT RESPONSIBILITIES

DSA1.0 Potential hazards and risks to staff, patients and visitors are minimized.

DSA1.2	A safety manual is readily available to staff that includes:	
DSA1.2.1	**M**	• how to access first aid services and/or medical assistance for staff related injuries *Guidance: If the diagnostic 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.*
DSA1.2.4	**M**	• requirements for use of personal protective and other safety equipment
DSA1.2.5	**M**	• Workplace Hazardous Materials Information System (WHMIS) program information
DSA1.2.6	**M**	• emergency evacuation plans
DSA1.2.7	**M**	• procedures to protect staff “working alone” or in “isolation” *Guidance: "Working alone or in isolation" is defined as 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.*
DSA1.2.8	**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"). WorkSafeBC 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.*

SAFETY PRACTICES AND EQUIPMENT

DSA1.4	**Chemicals are used, stored and disposed of safely.**	
DSA1.4.1	**M**	Hazardous liquids such as corrosives are stored below eye level.
DSA1.4.4	**M**	Flammable liquids are stored in approved cabinets. *Guidance: Refer to the product material safety data sheets (MSDS) for handling and storage.*
DSA1.4.5	**M**	Material safety data sheets (MSDS) are available and current for controlled substances subject to WHMIS regulations.
DSA1.4.6	**M**	Controlled substances are 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.*
DSA1.5	**Spills are responded to in an effective and safe manner.** *Guidance: Based upon the chemicals used (e.g. gluteraldehyde) the diagnostic service should consult with WorkSafeBC 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 diagnostic 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 situation, staff must have prior training in the procedures and the required personal protective equipment (e.g. P100 or cartridge respirators).*
DSA1.6	**Centrifuges are used safely.** *Intent: The use of centrifuges is limited in most diagnostic imaging services. They are, however, still used as part of the white and red blood cell labeling processes in nuclear medicine.*	
DSA1.6.1	**M**	Centrifuges have safety-capped cups or rotor enclosures that provide aerosol containment.
DSA1.6.2	**M**	Centrifuge lids or doors are locked when the motor is energized and remain locked until the centrifuge stops.
DSA1.7	**Compressed gas is maintained and stored safely.** *Guidance: An example of a compressed gas would be portable oxygen.*	
DSA1.7.1	**M**	Gas cylinders are clearly labeled with the cylinder's contents.
DSA1.7.2	**M**	A pressure-reducing regulator or device is used for all compressed gas cylinders.
DSA1.7.3	**M**	Any gauge whose pointer (or needle) does not go back to the zero point when pressure is removed is replaced.
DSA1.7.4	**M**	Adapters between cylinders and pressure reducing regulators are **not** used.
DSA1.7.5	**M**	Cylinders not in use are shut off and capped.

DSA1.7.6	**M**	Cylinders are secured to prevent falling during storage, transportation and use.
DSA1.8	**Fume hoods are operated in a manner that protects staff.** *Intent: The use of fume hoods in diagnostic imaging may be limited to nuclear medicine radiopharmacies.*	
DSA1.8.1	**M**	There is a marking on the sash to indicate the maximum height to which the face can be opened and still maintain the required flow rate.
DSA1.8.2	**M**	Fume hood face velocity is checked at least annually, after installation, after movement of the unit, and after any repair or maintenance that could affect the airflow of the hood.
DSA1.8.3	**M**	Fume hood operation ensures optimal conditions are maintained (e.g. proper sash height, free of obstructions).
DSA1.8.4	**M**	All **new** fume hood installations have an alarm capable of indicating when the average face velocity falls below the minimum average face velocity.
DSA1.9	**Biological safety cabinets (BSC) are operated in a manner that protects staff.** *Intent: The use of biological safety cabinets in diagnostic imaging may be limited to white cell labeling in nuclear medicine.*	
		BSCs are certified to ensure filters are functioning properly and that airflow meets specifications:
DSA1.9.1	**M**	• on installation
DSA1.9.6	**M**	Certification of BSCs is conducted by an individual with knowledge, training and experience. *Guidance: Consult with WorkSafeBC for guidance on confirming that an individual has the knowledge, training and experience as acceptable to WorkSafeBC.*
DSA1.9.9	**M**	The airflow at the face of the BSC is monitored and recorded daily. *Guidance: Refer to the WorkSafeBC Laboratory Health and Safety Handbook for acceptable face velocities for different designs of biological safety cabinets.*
DSA1.10	**Fire safety measures are implemented.**	
DSA1.10.1	**M**	Appropriate fire extinguishing equipment and procedures are in place.
DSA1.11	**Electrical safety measures are implemented.**	
DSA1.11.1	**M**	Equipment and supplies are clearly labelled and comply with electrical safety regulatory requirements (e.g. Canadian Standards Association (CSA) or equivalent).
DSA1.13	**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 to protect staff from chemical or biological hazards. *Guidance: Personal protective equipment may include gloves, lab coats/gowns and masks.*
DSA1.13.2	**M**	Latex-free gloves are available to staff with latex sensitivities.

DSA1.14	**There are mechanisms in place to prevent staff from assuming postures that could result in musculoskeletal injuries.**	
DSA1.14.4	**M**	Adequate assistance and transfer/lift devices are available when moving or lifting patients. *Guidance: Transfer/lift devices include "transavers," slider boards and ceiling or mobile patient lifts*.
DSA1.14.5	**M**	The weight limit of lifting equipment is clearly marked.

APPROPRIATE PHYSICAL ENVIRONMENT

DSA2.0 The design and layout of the physical space allows service delivery to be safe, efficient and accessible for patients, visitors and staff.

DSA2.1	**The design and layout of the physical space meets laws, regulations and codes.**	
DSA2.1.1	**M**	A professional engineer, responsible for the build, has attested that the new construction or structural changes meet the minimum CSA Standards.
DSA2.1.3	**M**	Emergency exit routes are marked and provide unimpeded exit.
DSA2.3	**The physical environment ensures patient safety and privacy.**	
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	**M**	Furniture is safe for patient use.
DSA2.3.5	**M**	Patient information cannot be viewed by other patients or visitors.
DSA2.3.6	**M**	Patient privacy is not compromised during the diagnostic procedure.

DSA2.4	**The design and layout of the space supports safe and appropriate service delivery.**	
DSA2.4.3	**M**	Activity, workspace and equipment is designed or positioned to reduce the risks of ergonomic distress disorders and accidents (e.g. musculoskeletal injuries, repetitive stress injuries, etc.). *Guidance: If workers experience symptoms indicating a musculoskeletal 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 musculoskeletal 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. WorkSafeBC 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 http://www2.worksafebc.com/pdfs/ergonomics/MSI_worksheet_A_fillable.pdf?_ga=1.245774660.1138311406.1379014432 and http://www2.worksafebc.com/pdfs/ergonomics/MSI_worksheet_B_fillable.pdf?_ga=1.149796342.1138311406.1379014432.*
DSA2.4.4	**M**	Security measures are in place relative to the threat of theft and tampering with patient samples, drugs, chemicals and confidential information. *Guidance: The threat of theft or tampering is assessed, and based upon that assessment appropriate security measures are implemented.*
DSA2.5	**The physical environment meets the needs of staff.**	
DSA2.5.1	**M**	A secure and private location for changing clothing and for storage of personal belongings is available to staff.
DSA2.5.4	**M**	Storage and consumption of food and beverages is permitted in designated areas only.
DSA2.6	**Sinks and eyewashes are available to staff.**	
DSA2.6.1	**M**	There are clearly labeled hand washing sinks in areas where biological materials are handled. *Intent: Sinks used for soiled equipment are deemed "dirty" and not used for hand washing.*
DSA2.6.2	**M**	Hand washing sinks have unimpeded drainage (e.g. not stoppers).
DSA2.6.4	**M**	Eyewash stations are conveniently located and regularly flushed, when appropriate. *Guidance: Consult with WorkSafeBC to determine the type of eyewash station required based upon the chemicals used in the diagnostic service.*
DSA2.7	**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 and tested regularly for effective function. *Guidance: For facilities with backup power (e.g. emergency generators), an additional emergency lighting system is made available to staff (e.g. flashlight).*

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PATIENT SAFETY

MEDICATION MANAGEMENT AND ADMINISTRATION

DPS4.0 **The diagnostic 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.

DPS4.1	**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.
DPS4.2	**The imaging service ensures that all medications are labeled.**	
DPS4.2.1	**M**	Medication containers are labeled with the medication name, strength and quantity when medications are prepared but not administered immediately.

MEDICAL EMERGENCY MANAGEMENT

DPS6.0 **The imaging service has procedures in place to handle medical emergencies.**

DPS6.1	**There are procedures to handle medical emergencies in a timely and effective manner.**	
DPS6.1.1	**M**	There is a medical emergency response protocol in place.
DPS6.1.2	**M**	Staff are familiar with the procedure(s) for responding to medical emergencies.

DPS6.1.3	**M**	Emergency call systems are available in patient care areas. *Guidance: Facilities should conduct a risk assessment to determine what emergency call systems are required (e.g. patient washrooms, changing rooms, etc.).*
		Staff know how to access:
DPS6.1.4	**M**	• emergency medical services
DPS6.1.5	**M**	• emergency equipment and supplies
DPS6.1.6	**M**	The facility identifies staff who respond to medical emergencies and provides training in the use of emergency equipment.

DPS7.0 Emergency procedures, equipment and supplies are available to address medical emergencies resulting from high-risk procedures.

Intent: High-risk procedures include complex interventional procedures, TEE, stress 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, pneumothorax, and sedation-related respiratory compromise.

DPS7.1		**Emergency procedures, equipment and supplies are available to respond to a medical emergency resulting from a *high-risk procedure*.**
DPS7.1.2	**M**	Oxygen and suction equipment with appropriate delivery devices and attachments are readily available.
		Emergency equipment and supplies are:
DPS7.1.4	**M**	• appropriate for the patient population (e.g. adults and pediatrics)
DPS7.1.5	**M**	• regularly inspected and maintained
DPS7.1.6	**M**	• available
		Emergency drugs are:
DPS7.1.7	**M**	• available
DPS7.1.8	**M**	• within expiry date
DPS7.1.9	**M**	• secure

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INFECTION PREVENTION AND CONTROL

ROUTINE PRACTICES

DIPC2.0 **Routine practices for preventing the transmission of infection are implemented.**

Guidance: The term "routine practices" (or "standard precautions") is used to describe a system 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.

DIPC2.1	**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 readily-accessible designated hand hygiene sinks or other forms of hand hygiene products.

ADDITIONAL PRECAUTIONS

DIPC4.0 **Patients, staff and visitors are protected from potential or known communicable diseases.**

DIPC4.1	**Additional precautions are used for patients with known or suspected communicable diseases.**	
DIPC4.1.5	**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.*

DIPC5.0 Blood and body fluids precautions for staff are safe and effective.

DIPC5.1	**There is a defined follow up process that addresses possible or actual blood and body fluids exposure.**	
DIPC5.1.3	**M**	There are documented policies and procedures for the prevention and follow-up of blood and body fluids exposures.
DIPC5.2	**Safe and effective practices are followed for the use and disposal of sharps.**	
DIPC5.2.1	**M**	Safety engineered sharps or devices that have built in safety mechanisms are used.
DIPC5.2.3	**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.*

CLEANING OF SURFACES AND ANCILLARY MEDICAL EQUIPMENT

DIPC6.0 The physical environment of the imaging service is clean.

DIPC6.1	**Safe and effective cleaning of the physical environment is ensured.**	
DIPC6.1.2	**M**	Equipment and surfaces in direct contact with a patient or blood and body fluids are cleaned and disinfected before use with another patient.
DIPC6.1.3	**M**	A barrier (sheet or paper) is placed on the procedure table and changed between patients. Alternatively, the table is cleaned between patients.

DECONTAMINATION OF REUSABLE SEMI-CRITICAL MEDICAL DEVICES

DIPC7.0 Standardized reprocessing practices for the decontamination of reusable semi-critical medical devices are implemented.

DIPC7.2	**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.[1]

DIPC7.4	**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.
DIPC7.4.5	**M**	Chemical test strips or chemical indicators are used within the expiry date and are stored as per manufacturer's recommendations.

INFORMATION MANAGEMENT

PLANNING

DIM3.0 There are processes to ensure the availability of information.

DIM3.1	**The diagnostic service is prepared for events that could impact the availability of information.**	
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.).
DIM3.2	**Downtime procedures are available and communicated to staff.** *Intent: Downtime procedures are required for both scheduled and unscheduled system downtime.*	
DIM3.2.2	**M**	Users know how to contact support staff in the event of system and/or equipment malfunction.

CONFIDENTIALITY

DIM4.0 Patient confidentiality and information is protected through policies and procedures.

DIM4.1	**Data access is restricted, controlled and monitored.**	
DIM4.1.2	**M**	Authorized staff maintain user access and restriction controls.
DIM4.1.3	**M**	User access is monitored.
DIM4.1.6	**M**	Generic login accounts are not used.

MEDICAL RECORDS

DIM5.0 The diagnostic service maintains complete and accurate medical records.

See also Global Modality Accreditation Standard, GM 7.0 and modality-specific accreditation standards.

DIM5.1	**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.*
DIM5.3	**Current and historical clinical data can be accessed by staff and clients when needed.**	
DIM5.3.6	**M**	There is sufficient storage for hardcopy records (including films and paper).

DOCUMENT CONTROL

DIM6.0 The diagnostic service defines and maintains procedures to control key operational documents.

Guidance: This standard refers to key documents such as operational policies and procedures.

DIM6.2	**There are mechanisms to communicate changes to procedures and documentation.**	
DIM6.2.1	**M**	New or revised policies, procedures, protocols and/or positioning manuals are communicated and available to staff.

Accreditation Standards for Relocation Assessment

Diagnostic Imaging

IMAGING INFORMATICS

EQUIPMENT AND INTEGRATION

II1.5	**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. *Guidance: The process includes verification of modality DICOM transfers, RIS to modality work list creation and measurement tool accuracy.*

DIGITAL IMAGE DATA MANAGEMENT – PACS AND TELERADIOLOGY

II2.0 **Appropriate equipment is used for acquisition, communication, display, and storage of images.**

For all digital image data, the initial data set provides full resolution data for processing, manipulation, and subsequent display.

II2.2	**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.*	
II2.2.1	**M**	• patient name
II2.2.2	**M**	• unique patient identifier
II2.2.3	**M**	• date and time of acquisition
II2.2.4	**M**	• name of acquisition facility (site or origin)

II2.2.5	**M**	• modality
II2.2.6	**M**	• examination
II2.2.7	**M**	• patient or anatomic part orientation (e.g. right, left, superior, inferior etc.)
II2.2.8	**M**	• amount and method of data compression
II2.4	**Primary display systems used for interpretation of diagnostic images 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.*	
II2.4.1	**M**	• 1600 x 1200 (1.9 mega pixel) monitor or better
II2.4.2	**M**	• a luminance ratio of at least 250:1 under normal reading conditions
II2.4.3	**M**	• a luminance of 170 cd/m^2 under normal reading conditions
		For digital mammography:
II2.4.4	**M**	Display workstations conform to the IHE Mammography Image Profile including the display actor.
II2.4.5	**M**	A minimum of two portrait set-up monitors or equivalent are used and the resolution of each monitor is at a minimum 5 megapixels.[2]
II2.4.6	**M**	Luminance ratio is between 250 and 650 (including ambient light).[3]
II2.4.7	**M**	A minimum luminance of 250 cd/m^2 is maintained.[4] *Guidance: A luminance of 450 cd/m^2 is strongly recommended for digital mammography primary displays.*
II2.5	**Primary display systems accurately reproduce the original examination.**	
		Primary display systems have the ability to:
II2.5.1	**M**	• select the image sequence
II2.5.2	**M**	• accurately associate the patient and study demographic data with the images
II2.5.3	**M**	• adjust the brightness and contrast or interactive window and level function
II2.5.4	**M**	• invert the gray-scale values of the displayed image
II2.5.5	**M**	• zoom (magnification) the image
II2.5.6	**M**	• reproduce digital mammography images at 1:1 or 100% size (e.g. full resolution)[5]
II2.5.7	**M**	• rotate and flip the displayed images while preserving the orientation of the patient label

II2.5.8	**M**	• calculate and display accurate linear measurements and determine pixel values appropriate for the modality (e.g. Hounsfield values for CT images)
II2.5.9	**M**	• display prior image compression ratio, processing, or cropping
II2.5.10	**M**	• display image acquisition characteristics (e.g. matrix size and bit depth)
II2.5.11	**M**	• display the total number of images acquired in the series and clinically relevant technical parameters
II2.6	**Primary display system reporting environments are established considering patient confidentiality, ergonomics and environmental issues.**	
II2.6.2	**M**	Ambient light is low and consistent.[6] *Guidance: Ambient light is maintained between 20-40 lux.*
II2.6.3	**M**	Lighting controls are used, where appropriate. *Guidance: In hybrid reading environments (where soft and hard copy images are read) lighting controls are required*.
II2.6.6	**M**	Display workstations are in locations that do not compromise patient confidentiality.
II2.6.8	**M**	Patient information applications are configured to automatically log-off when inactive for a predetermined length of time.
II2.8	**Secondary display systems meet the needs of their intended user.**	
		Secondary display systems used for **clinical decision making by a physician** have at a minimum:
II2.8.1	**M**	• a 1024 x 1280 monitor or better • *Guidance: A pixel matrix of 1600 x 1200 is strongly recommended.*
II2.8.2	**M**	• a luminance ratio of at least 250:1 under normal viewing conditions
II2.8.3	**M**	• a luminance of 170 cd/m^2 under normal viewing conditions
		Secondary display systems used for **image review** have at a minimum: *Guidance: Secondary displays systems used for image review also include image acquisition displays. Typically, these secondary monitors are viewed by technologists to ensure images sent to PACS are available for interpretation and appropriately displayed (e.g. correct markers, orientation, annotations).*
II2.8.5	**M**	• a luminance ratio of at least 100:1 under normal viewing conditions
II2.8.6	**M**	• a luminance of 100 cd/m^2 under normal viewing conditions
		For digital mammography:
II2.8.7	**M**	Secondary monitors used for clinical decisions have a minimum resolution of 3 mega pixels. *Guidance: Clinical decisions in mammography include review prior to stereotactic biopsy, fine wire localization and specialized views (e.g. coned compression).*

II2.9	**Secondary display system reporting environments are established considering patient confidentiality, ergonomics and environmental issues.**	
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.*
II2.9.4	**M**	Display workstations are configured to automatically log-off when inactive for a predetermined length of time.
II2.10	**Archives and retrieval ensures timely access to current and historical data.** *Intent: Quality patient care may depend on timely availability of the image interpretation.*	
II2.10.11	**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.*
II2.10.12	**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.
II2.10.13	**M**	Only lossless compression is utilized for the transmission and storage of mammography images.

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Diagnostic Imaging

EQUIPMENT AND SUPPLIES

EQUIPMENT OPERATION

DES1.0 Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

DES1.2		Imaging systems and ancillary equipment are appropriately operated.
DES1.2.1	**M**	An orientation and training program is provided to those who use the equipment to ensure safe, consistent, and accurate operation.
DES1.2.2	**M**	Specialized equipment and instrumentation is operated by competent staff with the necessary education, knowledge, skills and certification.
DES1.2.3	**M**	Equipment is used only as intended by the manufacturer.
DES1.2.4	**M**	Equipment operators have access to the manufacturer's operator manual for the specific equipment used in the facility.[7]
DES1.2.5	**M**	All equipment is located and stored in a safe and secure location.
DES1.2.6	**M**	Staff are made aware of table weight limits. *Guidance: Weight limits are labeled directly on the table whenever possible.*
DES1.2.7	**M**	The scanning of patients who exceed the table weight limit is considered on a case-by-case basis.
DES1.2.10	**M**	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.
DES1.2.11	**M**	Insufflators are equipped with a filter and reservoir to prevent the reflux of colonic effluent into the insufflation device.

EQUIPMENT TESTING AND QUALITY ASSURANCE

DES2.0 Equipment testing is performed prior to clinical use.

DES2.1	**Acceptance testing is performed after purchase and prior to clinical use of equipment.**	
DES2.1.1	**M**	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.).*
DES2.1.2	**M**	The tester is independent of the manufacturer.[8]
		Acceptance testing of imaging equipment includes:
DES2.1.4	**M**	• an initial inspection of the system and any ancillary equipment
DES2.1.5	**M**	• an inspection of documentation
DES2.1.6	**M**	The DAP is notified of new or replaced equipment prior to clinical use. *Guidance: A notification of significant change in service form must be submitted to the DAP along with an acceptance testing report prior to clinical use of the equipment. The notification of significant change in service form is available at http://www.cpsbc.ca/programs/dap/accreditation/diagnostic-imaging.*
DES2.1.7	**M**	Acceptance testing reports are submitted to the DAP.

COMMON EQUIPMENT QUALITY CONTROL

DES3.0 Quality assurance programs are established to ensure the attainment of intended quality.

DES3.5	**Quality control procedures are established and used to monitor performance of *electronic display devices (monitors/image display systems).*** *Guidance: The conditions for the testing are to be similar to those under normal use of the equipment.*	
DES3.5.1	**M**	The performance of **all** 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: At a minimum, primary display systems are verified for compliance with the DICOM Grayscale Standard Display Function (GSDF) and recalibrated if necessary.*

SUPPLIES MANAGEMENT

DES4.0 Supplies are monitored in a way that reduces or eliminates shortages and waste.

DES4.1	**The storage and monitoring of supplies ensures an effective inventory control system.**	
DES4.1.1	**M**	Storage complies with manufacturer's recommendations.

GLOBAL MODALITY

INTRAVASCULAR CONTRAST AGENTS

GM4.0 Intravascular contrast agents are managed and administered safely and effectively.

GM4.1	**Emergency equipment and supplies are available for a response to a medical emergency.** *Guidance: See also Patient Safety Accreditation Standard DPS 6.0; Medical Emergency Management.*	
GM4.1.1	**M**	When IV contrast is administered there is either an emergency crash cart or a modified emergency cart immediately accessible. *Guidance: 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 emergency crash cart contains, at a minimum, the following:
		Airway
GM4.1.3	**M**	• oral airway set
GM4.1.4	**M**	• suction equipment with tubing and catheter
		Breathing
GM4.1.5	**M**	• O2 face mask (non-rebreather)
GM4.1.6	**M**	• bag-valve-mask device (e.g. Ambu-bag with mask)
GM4.1.7	**M**	• oxygen tank ("D" Cylinder) with flow valve and tubing
GM4.1.8	**M**	• pulse oximeter
		Circulation

GM4.1.9	**M**	• cardiac defibrillator
GM4.1.10	**M**	• stethoscope
GM4.1.11	**M**	• blood pressure cuff
GM4.1.12	**M**	• intravenous supplies
GM4.1.13	**M**	• tourniquet, 4 X 4 gauze and tape
GM4.1.14	**M**	• IV catheters (18 gauge or large
GM4.1.15	**M**	• IV pole and tubing
GM4.1.16	**M**	• normal saline (2 X 500 cc bags)
		Other
GM4.1.17	**M**	• flashlight
GM4.1.18	**M**	• an emergency drug tray is available in the room
		The emergency drug tray includes the following:
GM4.1.19	**M**	• nitroglycerine, in tablet or aerosol spray
GM4.1.20	**M**	• epinephrine
GM4.1.21	**M**	• atropine
GM4.1.22	**M**	• intravenous supplies
GM4.1.23	**M**	• parenteral antihistamine
GM4.1.24	**M**	• parenteral antiemetic
GM4.1.25	**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
GM4.3	**There is physician supervision for all examinations that involve intravenous contrast agent administration.**	
GM4.3.1	**M**	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.*

SEDATION AND ANESTHESIA

GM5.0 Appropriate patient monitoring is provided for procedures involving moderate sedation or general anesthesia.

Intent: Moderate sedation is commonly referred to as conscious sedation.

GM5.2		**Patients are appropriately monitored during and after the examination when either moderate sedation or general anesthesia are administered.**
GM5.2.2	**M**	Monitoring equipment, resuscitation equipment and associated procedures are appropriate for the patient population (e.g. adults and pediatrics).
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.
GM5.2.8	**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.*
GM5.2.17	**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.

Accreditation Standards for Relocation Assessment

Diagnostic Imaging

RADIATION SAFETY

MINIMIZING RADIATION EXPOSURE TO STAFF AND VISITORS

RS1.0 **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		
RS1.1.1	**M**	An X-ray room is not used for more than one radiological investigation simultaneously.
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.
RS1.3	**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. *Guidance: Refer to Health Canada Safety Code 35 Appendix VI for acceptable X-ray warning symbols: http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/safety-code_35-securite/index-eng.php#app6.*
		The X-ray warning symbol:
RS1.3.2	**M**	• is displayed in two contrasting colours
RS1.3.3	**M**	• is legible from a distance
RS1.3.4	**M**	• bears the words “CAUTION: X-RAYS—ATTENTION: RAYONS X” *Intent: Room warning signage may reflect the requirements in place at the time of equipment installation (e.g. rooms with equipment installed prior to September 2011 do not require bilingual signage); however, facilities are strongly encouraged to update their warning signage to meet the new requirements.*

RS1.3.5	**M**	Rooms with stationary X-ray equipment, which can be accessed from public areas, are identified with signage stating "Unauthorized Entry Prohibited." *Intent: Signage must be affixed on or adjacent to the X-ray room door to ensure no individual inadvertently enters the room during exposure.*
RS1.7	**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	**M**	Protective thyroid shields with an equivalent of 0.50 mm lead (Pb) are used.
RS1.7.2	**M**	Leaded glasses are used.

MINIMIZING RADIATION EXPOSURE TO PATIENTS

RS2.0 Appropriate measures are in place to prevent unnecessary radiation exposure to patients.

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.

RS2.1	**Mechanisms are in place to prevent unnecessary radiation to patients.**	
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.
RS2.1.6	**M**	Infant immobilizers are available for pediatric imaging.

RS3.0 Patient radiation dose is effectively managed.

RS3.1	**Mechanisms are in place to manage patient radiation dose.**	
RS3.1.2	**M**	All new radioscopic and radiographic equipment can record patient dose in the form of the dose-area product (DAP) or reference point air kerma (Kar).

EQUIPMENT REQUIREMENTS

RS4.0 Equipment is maintained and monitored in a manner that ensures performance specifications and radiation safety are met.

RS4.1		**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.[9] *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
		Mammography systems ensure:
RS4.1.12	**M**	• an irradiation switch that requires continuous pressure by the operator to emit X-rays
		Intent: The following requirements must be met for all retrofitted X-ray and mammography systems.
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 system 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 used or refurbished 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.
RS4.2		**New and replaced medical X-ray equipment is registered with the Diagnostic Accreditation Program of BC and includes the following information:** *Guidance: The registration of X-ray equipment is limited to radiographic, radioscopic and computed tomography systems. Registration forms are available at https://www.cpsbc.ca/programs/dap/accreditation/diagnostic-imaging.*
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
RS4.3	**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 kVp 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**	• 0.50 mm of lead, for examinations where the peak X-ray tube voltages is 150 kV or greater
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. 150 kV) it is recommended that gonad shields for patients have a lead equivalent thickness of 0.50 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. *Guidance: Refer to RS6.3.6 for control booth glass requirements.*

RADIATION PROTECTION SURVEYS – RADIOLOGY, MAMMOGRAPHY AND CT

RS5.0 An evaluation of the radiation safety of the facility is conducted at appropriate frequencies.

RS5.1	**Radiation protection surveys are conducted to assess safety when:**	
RS5.1.1	**M**	• there is a new installation *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 resolved 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.*
RS5.1.2	**M**	• existing equipment is relocated

RS5.2	**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.*	
RS5.2.1	**M**	Surveyors are qualified by education and experience to perform advanced or complex procedures in radiation protection.
		The survey report includes:
RS5.2.2	**M**	• a sketch of the facility, showing the location of the X-ray equipment and control booth/panel within the facility as well as identifying the nature and occupancy of the areas adjoining the facility
RS5.2.3	**M**	• identification of the X-ray equipment (e.g. the name of the manufacturer, model designation and serial number of the generator, console, X-ray tube assembly, X-ray table, etc.) and the date, or at least approximate date manufactured
RS5.2.4	**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.)
RS5.2.5	**M**	• observations made of the operational conditions (both electrical and mechanical) of the X-ray equipment at the time of the survey
RS5.2.6	**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.
RS5.2.7	**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 *Guidance: For a mammography facility with shielding design/calculations requiring only standard construction materials, a visual survey of the integrity of the standard construction materials provides an adequate assessment for the radiation protection survey. Construction materials for radiation shielding are based on the shielding calculations required in RS6.1.*
RS5.2.8	**M**	• a review of the available personal protective equipment, mobile protective barriers and other protective devices
RS5.2.9	**M**	• an indication of the estimate of potential exposures to personnel and general public in or around the facility
RS5.2.10	**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.)
RS5.2.11	**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 *Guidance: Refer to RS5.1.4.*
RS5.2.12	**M**	• an assessment of radiological techniques from the point of view of radiation safety *Guidance: When possible, techniques and patient doses are reviewed and compared to established diagnostic reference levels.*

RS5.2.13	**M**	• a review of the facility's quality assurance program to ensure it exists and is maintained, including quality control testing records
RS5.2.14	**M**	• recommending when there is a need for a follow-up survey
RS5.2.15	**M**	The results of surveys including conclusions drawn by the surveyors are submitted to the owner, radiation safety officer or responsible user in a written report.

FACILITY REQUIREMENTS

Note: 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.[10]

RS6.0 **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*

RS6.1		**Appropriate steps are taken to ensure adequate shielding is present in controlled and uncontrolled areas.**
RS6.1.1	**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.
RS6.1.2	**M**	The radiation levels in uncontrolled areas are such that no person receives more than 1 mSv per year.
RS6.1.3		The radiation levels in uncontrolled areas where **radiosensitive populations** are present, such as pediatric wards, are limited to 0.3 mSv per year.
RS6.1.4	**M**	Film storage containers and CR cassettes are shielded to ensure excessive exposure does not occur. *Guidance: Film is stored in a place with a radiation level less than 0.1 mGy over the storage period. Given that CR cassettes are used more frequently and stored for shorter periods of time, a limit of 0.5µGy is acceptable.*
RS6.1.5	**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.

FACILITY REQUIREMENTS – RADIOLOGY, MAMMOGRAPHY AND CT

RS6.2		**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 (e.g. 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 tube(s)
RS6.2.3	**M**	• the location of the control booth or control panel
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(s) where image processing is performed (e.g. location of darkrooms, film or CR cassette storage area, CR reader and computer workstations)
RS6.2.7	**M**	• the position of all windows, doors, louvers, 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 *Guidance: In mammography, the image receptor assembly acts as the primary protective barrier, therefore floor plans must indicate that the intervening shielding between the equipment and occupied areas will act as secondary barriers to attenuate scattered and leakage radiation.*
RS6.3	**Radiation safety planning includes considerations for room design and layout.** *See also Radiation Safety Accreditation Standards RS1.3.1-RS1.3.2 for the requirements for radiation warning and restricted access signage.*	
RS6.3.1	**M**	Mobile X-ray and mammography equipment used routinely in one location is considered as a fixed installation and the shielding needs for the equipment and room are determined accordingly.
RS6.3.4	**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 0.4mSv/week. *Guidance: The control booth is located in an area, whenever possible, such that the radiation is 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**	The lead equivalency of the control booth glass is documented and is readily available. *Guidance: This includes the transparent shield protecting the mammography console.*
RS6.3.7	**M**	Shielding is constructed to form an unbroken barrier and if lead is used, it is adequately supported to prevent “creeping.”

Accreditation Standards for Relocation Assessment

Diagnostic Imaging

RADIOLOGY

IMAGING PROCEDURES

RA3.0 Standard protocols result in images appropriate for their intended use in clinical decision-making.

RA3.3	**Examinations are performed following established protocols.**	
RA3.3.1	**M**	Protocols are readily available to staff performing the examination.
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.*[11]
RA3.3.8	**M**	Technique charts are available and reflective of the equipment used.

ACCEPTANCE TESTING AND QUALITY ASSURANCE

RA12.0 Equipment testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES 2.0.

RA12.1	**Acceptance testing is performed after purchase and prior to clinical use of *film-based systems*.**	
		Acceptance testing includes visual and functional testing of the:
RA12.1.1	**M**	• mechanical properties
RA12.1.2	**M**	• safety systems
		Testing includes evaluation of the:

RA12.1.3	**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).*
RA12.1.4	**M**	•	backup timer *Intent: The backup (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.*
RA12.1.5	**M**	•	radiation output reproducibility
RA12.1.6	**M**	•	radiation output linearity
RA12.1.7	**M**	•	(HVL) X-ray beam filtration
RA12.1.8	**M**	•	automatic exposure control (AEC)
RA12.1.9	**M**	•	X-ray field and light field alignment
RA12.1.10	**M**	•	X-ray beam collimation
RA12.1.11	**M**	•	accuracy of the dose area product value
RA12.1.12	**M**	•	grid performance
RA12.1.13	**M**	•	dynamic range
RA12.1.14	**M**	•	high contrast resolution (spatial resolution)
RA12.1.15	**M**	•	low contrast detectability (contrast detectability)
RA12.1.16	**M**	•	artifacts *Intent: This is a visual test of image uniformity.*
RA12.1.17	**M**	•	phantom dose measurements (phantom entrance dose rate)
RA12.2	**Acceptance testing is performed after purchase and prior to clinical use of *CR/DR systems*.**		
	Acceptance testing includes visual and functional testing of the:		
RA12.2.1	**M**	•	mechanical properties
RA12.2.2	**M**	•	safety systems
	Testing includes evaluation of the:		
RA12.2.3	**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).*

RA12.2.4	**M**	• backup timer *Intent: The backup (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.*
RA12.2.5	**M**	• radiation output reproducibility
RA12.2.6	**M**	• radiation output linearity
RA12.2.7	**M**	• (HVL) X-ray beam filtration
RA12.2.8	**M**	• automatic exposure control (AEC)
RA12.2.9	**M**	• X-ray field and light field alignment
RA12.2.10	**M**	• X-ray beam collimation
RA12.2.11	**M**	• accuracy of the dose area product value
RA12.2.12	**M**	• grid performance
RA12.2.13		• response function
RA12.2.14	**M**	• exposure index or manufacturer's equivalent measure
RA12.2.15	**M**	• dynamic range
RA12.2.16	**M**	• noise, uniformity and image artifacts
RA12.2.17	**M**	• high contrast resolution (spatial resolution)
RA12.2.18	**M**	• low contrast detectability (contrast detectability)
RA12.2.19	**M**	• digital detector residual image
RA12.2.20	**M**	• phantom dose measurements (phantom entrance dose rate)
RA12.2.21		• modulation transfer function (MTF)
RA12.3	**Acceptance testing is performed after purchase and prior to clinical use of *radioscopic systems*.**	
	Acceptance testing includes visual and functional testing of the:	
RA12.3.1	**M**	• mechanical properties
RA12.3.2	**M**	• safety systems
	Testing includes evaluation of the:	

RA12.3.3	**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).*
RA12.3.4	**M**	•	radiation output reproducibility
RA12.3.5	**M**	•	radiation output linearity
RA12.3.6	**M**	•	(HVL) X-ray beam filtration
RA12.3.7	**M**	•	X-ray field and light field alignment
RA12.3.8	**M**	•	X-ray beam collimation
RA12.3.9	**M**	•	accuracy of the dose area product value
RA12.3.10	**M**	•	radioscopic timer and chronometer
RA12.3.11	**M**	•	grid performance
RA12.3.12	**M**	•	uniformity and artifacts
RA12.3.13	**M**	•	high contrast resolution (spatial resolution)
RA12.3.14	**M**	•	low contrast detectability (contrast detectability)
RA12.3.15	**M**	•	maximum air kerma rate
RA12.3.16	**M**	•	typical image receptor air kerma rate
RA12.3.17	**M**	•	automatic intensity control
RA12.3.18	**M**	•	phantom dose measurements (phantom entrance dose rate)
RA12.3.19		•	automatic brightness control

Accreditation Standards for Relocation Assessment

Diagnostic Imaging

MAMMOGRAPHY

PATIENT PREPARATION

MA2.0 Patients are appropriately prepared for the examination being performed.

MA2.3	**Measures are taken to maintain patient comfort and dignity during the examination.**	
MA2.3.1	**M**	Patients are provided with a gown (or other protective garment) to wear prior to and for the duration of the procedure.

IMAGING PROCEDURES

MA3.0 Standard protocols result in mammograms appropriate for their intended use in clinical decision-making.

MA3.3	**Examinations are performed following established protocols.**	
MA3.3.1	**M**	Protocols are readily available to staff performing the examination.

EQUIPMENT

MA11.0 Equipment is safely operated, maintained and monitored in a manner that ensures performance specifications are met.

MA11.1	**The imaging service ensures that equipment is capable of achieving the desired image quality and complies with the requirements of the examination.**	
MA11.1.1	**M**	Dedicated mammography X-ray equipment is used.

MA11.1.2	**M**	Specimen radiography is performed on a dedicated mammography unit or a specialized radiographic unit designed for specimen work.
		For **digital mammography facilities**
MA11.1.3	**M**	Mammography primary acquisition devices conform to the IHE Mammography Image Profile including the acquisition actor.
MA11.1.4	**M**	The diagnostic service has access to a printer capable of printing images for review by another non-digital mammography facility in a timely fashion. *Intent: Some mammography facilities with film-based systems may not have the capability to display digital mammograms.*
MA11.1.5	**M**	The images are printed on a FDA/HC approved mammography printer, utilizing film specifically designed for mammography images.[12]

ACCEPTANCE TESTING

MA12.0 Equipment testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES2.1.

MA12.1		**Acceptance testing of *film-based systems* is performed by a medical physicist after purchase and prior to clinical use.**
		Acceptance testing includes visual and functional testing of the:
MA12.1.1	**M**	• mechanical properties
MA12.1.2	**M**	• safety systems
		Testing includes evaluation of the:
MA12.1.3	**M**	• X-ray beam filtration and radiation beam quality
MA12.1.4	**M**	• X-ray tube voltage accuracy and reproducibility
MA12.1.5	**M**	• irradiation timer accuracy and reproducibility
MA12.1.6	**M**	• reproducibility of radiation output
MA12.1.7	**M**	• focal spot size
MA12.1.8	**M**	• proper radiation beam alignment
MA12.1.9	**M**	• light field/X-ray image receptor congruence
		Testing includes evaluation of ancillary components for:
MA12.1.10	**M**	• source to image receptor distance indicators accuracy
MA12.1.11	**M**	• compression device design and performance

MA12.1.12	**M**	• bucky system and grid performance
		Testing includes evaluation of automatic exposure control (AEC) for:
MA12.1.13	**M**	• reproducibility
MA12.1.14	**M**	• X-ray tube voltage compensation
MA12.1.15	**M**	• minimum response time
MA12.1.16	**M**	• thickness compensation response
MA12.1.17	**M**	• optical density setting response
MA12.1.18	**M**	• backup timer
		Testing includes evaluation of films, screens and cassettes for:
MA12.1.19	**M**	• adequacy of film-screen combination
MA12.1.20	**M**	• film-screen speed uniformity
MA12.1.21	**M**	• film-screen contact
MA12.1.22	**M**	• screen condition
		Testing includes evaluation of viewboxes for:
MA12.1.23	**M**	• brightness
MA12.1.24	**M**	• light output uniformity
MA12.1.25	**M**	• light output
MA12.1.26	**M**	• homogeneity
MA12.1.27	**M**	• ambient light control
		Testing includes evaluation of image processing for:
MA12.1.28	**M**	• light tightness
MA12.1.29	**M**	• safelight conditions
MA12.1.30	**M**	• cleanliness
MA12.1.31	**M**	• temperature control of water supply
MA12.1.32	**M**	• ventilation system
MA12.1.33	**M**	• fixer recovery system

		Testing includes evaluation of film processing for:
MA12.1.34	**M**	• condition of processing equipment
MA12.1.35	**M**	• film speed and contrast
MA12.1.36	**M**	• level of film base plus fog
MA12.1.37	**M**	• solution temperature
MA12.1.38	**M**	• replenishment rate
MA12.1.39	**M**	• fixer retention analysis
		Testing includes evaluation of imaging characteristics for:
MA12.1.40	**M**	• representative breast surface dose with mean glandular dose calculations
MA12.1.41	**M**	• dose calculations
MA12.1.42	**M**	• image spatial resolution
MA12.1.43	**M**	• image contrast
MA12.1.44	**M**	• image quality
MA12.2		**Acceptance testing of *CR/DR systems* is performed by a medical physicist after purchase and prior to clinical use of mammography X-ray equipment.** *Guidance: Acceptance testing is required when upgrading from film-screen systems to CR systems.*
		Acceptance testing includes visual and functional testing of the:
MA12.2.1	**M**	• mechanical properties
MA12.2.2	**M**	• safety systems
		Testing includes evaluation of the:
MA12.2.3	**M**	• X-ray beam filtration and radiation beam quality
MA12.2.4	**M**	• X-ray tube voltage
MA12.2.5	**M**	• reproducibility of radiation output and linearity
MA12.2.6	**M**	• focal spot size(s)
MA12.2.7	**M**	• loading time and current time product
MA12.2.8	**M**	• light field and X-ray field alignment
MA12.2.9	**M**	• radiation leakage

		Testing includes evaluation of ancillary components for:
MA12.2.10	**M**	• source to image receptor distance indicators accuracy
MA12.2.11	**M**	• compression force and thickness accuracy
MA12.2.12	**M**	• bucky/detector and grid performance
		Testing includes evaluation of automatic exposure control (AEC) for:
MA12.2.13	**M**	• reproducibility
MA12.2.14	**M**	• X-ray tube voltage compensation
MA12.2.15	**M**	• minimum response time
MA12.2.16	**M**	• thickness compensation response
MA12.2.17	**M**	• optical density setting response, if applicable
MA12.2.18	**M**	• backup timer
		Testing includes an assessment of:
MA12.2.19	**M**	• representative breast surface dose with mean glandular dose calculations
MA12.2.20	**M**	• dose calculations, including verification of dose estimation
MA12.2.21	**M**	• image spatial resolution
MA12.2.22	**M**	• image contrast and noise
MA12.2.23	**M**	• image quality
MA12.2.24	**M**	• image ghosting and residual image
MA12.2.25	**M**	• geometric distortion
MA12.2.26	**M**	• dose response at the image receptor

ULTRASOUND

IMAGING PROCEDURES

US3.0 Standard protocols result in images appropriate for their intended use in clinical decision-making.

US3.3	**Examinations are performed following established protocols.**	
US3.3.1	**M**	Protocols are readily available to staff performing the examination.
US3.3.2	**M**	Probes are cleaned and disinfected between patients. *Intent: Probes that only contact intact skin require cleaning and low-level disinfection.[13] 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.

EQUIPMENT

US11.0 Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

US11.1	**The imaging service ensures that equipment is capable of achieving the desired image quality and complies with the requirements of the examination.**	
		Ultrasound systems are equipped with:
US11.1.6	**M**	• a range of transducer frequencies appropriate for the examinations performed

ACCEPTANCE TESTING AND QUALITY ASSURANCE

US12.0 Equipment testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES2.1.

US12.1		Acceptance testing is performed after purchase and prior to clinical use of equipment.
US12.1.1	**M**	Acceptance testing is performed after purchase and prior to clinical use of equipment and includes a physical and mechanical inspection of the system and probes.
US12.1.2	**M**	Acceptance testing is performed after purchase and prior to clinical use of equipment and includes electrical leakage current testing of probes.
US12.1.3		Acceptance testing is performed after purchase and prior to clinical use of equipment and includes a uniformity assessment of the system and probes. *Guidance: Uniformity is assessed by scanning a homogenous region of a tissue-mimicking phantom (the region should have a texture similar to liver parenchyma and be free of targets). Each probe should be used to scan across the phantom assessing for image streaking. It is recommended that this assessment be performed by a **sonographer** to ensure proper imaging technique.*
US12.1.4		Acceptance testing is performed after purchase and prior to clinical use of equipment and includes an evaluation of geometric accuracy. *Guidance: Geometric accuracy is the comparison of a measured distance to a known distance. This evaluation requires a phantom with test targets (typically filament targets) measured along the vertical and horizontal axis.*
US12.1.5		Acceptance testing is performed after purchase and prior to clinical use of equipment and includes an assessment of system sensitivity. *Guidance: System sensitivity is the determination of the weakest echo signal detected and clearly displayed. Sensitivity can be expressed as a maximum visualization depth or a quantitative measure of signal-to-noise ratio (SNR). The assessment requires a phantom with test targets of known depths.*
US12.1.6		Acceptance testing is performed after purchase and prior to clinical use of equipment and includes verification of the spatial and contrast resolution of the system. *Guidance: Spatial and contrast resolution can be assessed using a phantom with targets of differing size and echogenic properties. At a minimum, lateral and axial resolution must be assessed using a phantom and filament targets distributed axially and laterally. To assess contrast resolution, targets with differing echogenic properties must be used.*

US12.1.7	Acceptance testing is performed after purchase and prior to clinical use of equipment and includes a quantitative assessment of each probe for lens delamination, element damage and cable integrity. *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.*
US12.1.8	For systems with harmonic imaging, acceptance tests are repeated in both modes.
US12.1.9	For systems with colour, pulsed or Doppler imaging, a qualitative evaluation of these capabilities is performed at acceptance.

ECHOCARDIOGRAPHY

IMAGING PROCEDURES

EC3.0 Standard protocols result in echocardiograms appropriate for their intended use in clinical decision-making.

EC3.3	**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.*[14]
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.*

APPROPRIATE PHYSICAL ENVIRONMENT

EC6.0 The design and layout of the echocardiography service's physical space allows service delivery to be safe, respectful and efficient for patients and staff.

EC6.1	**Transesophageal echocardiography is performed in an environment designed to ensure patient safety.**	
EC6.1.2	**M**	The room is large enough to accommodate emergency management monitoring equipment.
EC6.1.3	**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.
EC6.1.4	**M**	An emergency drug tray is available in the room.

		The contents of the emergency drug tray include, but are not limited to:
EC6.1.5	**M**	• nitroglycerine, in tablet or aerosol spray
EC6.1.6	**M**	• epinephrine
EC6.1.7	**M**	• atropine
EC6.1.8	**M**	• intravenous supplies
EC6.1.9	**M**	• parenteral antihistamine
EC6.1.10	**M**	• parenteral antiemetic
EC6.1.11	**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
EC6.2	**Stress echocardiography is performed in a safe environment and according to established protocols.**	
EC6.2.7	**M**	There is an emergency crash cart immediately accessible.
EC6.2.8	**M**	An emergency drug tray is available in the room.
		The contents of the emergency drug tray include:
EC6.2.9	**M**	• nitroglycerine, in tablet or aerosol spray
EC6.2.10	**M**	• epinephrine
EC6.2.11	**M**	• atropine
EC6.2.12	**M**	• intravenous supplies
EC6.2.13	**M**	• parenteral antihistamine
EC6.2.14	**M**	• parenteral antiemetic
EC6.2.15	**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
EC6.2.16	**M**	• a beta-blocker (if performing pharmacological stress testing)
EC6.2.20	**M**	• requirements for post-stress monitoring
EC6.2.21	**M**	• identification and treatment of common adverse events (e.g. hypertension, dyspnea, chest pain)

EQUIPMENT

EC11.0 Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

EC11.1	**The imaging service ensures that equipment is capable of achieving the desired image quality and complies with the requirements of the examination.**	
		Echocardiography systems are equipped with:
EC11.1.1	**M**	• real-time, 2D grey-scale imaging
EC11.1.2	**M**	• M-mode imaging
EC11.1.3	**M**	• colour, pulsed, tissue, power and continuous wave Doppler
EC11.1.4	**M**	• harmonic imaging
EC11.1.5	**M**	• a range of transducer frequencies appropriate for the examinations performed
EC11.1.6	**M**	• pediatric TEE transducers small enough to be used in a safe and prudent manner in infants and children appropriate for their body weight
EC11.1.7	**M**	• dedicated CW Doppler probe
EC11.1.8	**M**	• ECG display capability
EC11.1.9		• multi-planar probes for TEE
EC11.2	**Echocardiography equipment used for contrast enhanced imaging meets minimum performance requirements to ensure diagnostic quality.**	
EC11.2.1	**M**	Echocardiography equipment used for contrast enhanced imaging has the ability to adjust the mechanical index (MI). *Guidance: At a high MI, microbubble contrast agents are susceptible to destruction by insonation. Low MI imaging prolongs the effect of the contrast agent and optimizes the enhancement of the blood-myocardium interface.*

ACCEPTANCE TESTING AND QUALITY ASSURANCE

EC12.0 Equipment testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES 2.1.

EC12.1		Acceptance testing is performed after purchase and prior to clinical use of equipment.
EC12.1.1	**M**	Acceptance testing of the echocardiography equipment includes a physical and mechanical inspection of the system and probes.
EC12.1.2	**M**	Acceptance testing of the echocardiography equipment includes electrical leakage current testing of probes.
EC12.1.3		Acceptance testing of the echocardiography equipment includes a uniformity assessment of the system and probes. *Guidance: Uniformity is assessed by scanning a homogenous region of a tissue-mimicking phantom (the region should have a texture similar to liver parenchyma and be free of targets). Each probe should be used to scan across the phantom assessing for image streaking. It is recommended that this assessment be performed by a **sonographer** to ensure proper imaging technique.*
EC12.1.4		Acceptance testing of the echocardiography equipment includes an evaluation of geometric accuracy. *Guidance: Geometric accuracy is the comparison of a measured distance to a known distance. This evaluation requires a phantom with test targets (typically filament targets) measured along the vertical and horizontal axis.*
EC12.1.5		Acceptance testing of the echocardiography equipment includes an assessment of system sensitivity. *Guidance: System sensitivity is the determination of the weakest echo signal detected and clearly displayed. Sensitivity can be expressed as a maximum visualization depth or a quantitative measure of signal-to-noise ratio (SNR). The assessment requires a phantom with test targets of known depths.*
EC12.1.6		Acceptance testing of the echocardiography equipment includes verification of the spatial and contrast resolution of the system. *Guidance: Spatial and contrast resolution can be assessed using a phantom with targets of differing size and echogenic properties. At a minimum, lateral and axial resolution must be assessed using a phantom and filament targets distributed axially and laterally. To assess contrast resolution, targets with differing echogenic properties must be used.*
EC12.1.7		Acceptance testing of the echocardiography equipment includes a quantitative assessment of each probe for lens delamination, probe element damage and cable integrity. *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.*

EC12.1.8	For systems with harmonic imaging, acceptance tests are repeated in both modes.
EC12.1.9	For systems with colour, pulsed or Doppler imaging, a qualitative evaluation of these capabilities is performed at acceptance.

Accreditation Standards for Relocation Assessment

Diagnostic Imaging

COMPUTED TOMOGRAPHY

IMAGING PROCEDURES

CT3.0 Standard protocols result in images appropriate for their intended use in clinical decision-making.

CT3.3	**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.
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.*[15]
CT3.5	**Patient safety is monitored before, during and after a CT examination.**	
CT3.5.2	**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.
CT3.7	**CT colonography procedures are performed following established protocols.**	
CT3.7.1	**M**	Disposable catheters and tubing, connected to the insufflation apparatus, are not used for subsequent patients.
CT3.7.2	**M**	Colonic distension is performed using carbon dioxide and an automated insufflator.

ACCEPTANCE TESTING AND QUALITY ASSURANCE

CT12.0 Equipment testing is performed prior to clinical use.

CT12.1		Acceptance testing is performed after purchase and prior to clinical use of the equipment.
		Acceptance testing includes visual and functional testing of the:
CT12.1.1	**M**	• mechanical properties
CT12.1.2	**M**	• safety systems
		Testing includes evaluation of the:
CT12.1.3	**M**	• accuracy of loading factors
CT12.1.4	**M**	• CT number accuracy
CT12.1.5	**M**	• noise
CT12.1.6	**M**	• uniformity
CT12.1.7	**M**	• CT number calibration
CT12.1.8	**M**	• CT number linearity
CT12.1.9	**M**	• tomographic section thickness
CT12.1.10	**M**	• patient support movement
CT12.1.11	**M**	• laser light accuracy
CT12.1.12	**M**	• accuracy of automatic positioning of tomographic plane
CT12.1.13	**M**	• accuracy of gantry tilt
CT12.1.14	**M**	• spatial resolution
CT12.1.15	**M**	• low contrast detectability
CT12.1.16	**M**	• number dependence on phantom position
CT12.1.17	**M**	• radiation dose profile
CT12.1.18	**M**	• radiation dose *Guidance: The dose delivered from a scout localization image, which is a scanned projection radiograph.*
CT12.1.19	**M**	• CT dose index *Guidance: Establish a baseline computed tomography dose index (CTDI).*

Accreditation Standards for Relocation Assessment

Diagnostic Imaging

MAGNETIC RESONANCE IMAGING

IMAGING PROCEDURES

MR3.0 Standard protocols result in images appropriate for their intended use in clinical decision-making.

MR3.3	**Examinations are performed following established protocols.**	
MR3.3.1	**M**	Protocols are readily available to staff performing the examination.
MR3.3.3	**M**	Protocols are equipment specific. *Guidance: Due to differences in scanner design and functionality, imaging protocols are developed for each scanner.*

ACCEPTANCE TESTING AND QUALITY ASSURANCE

MR12.0 Equipment testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES2.1.

MR12.1	**Acceptance testing is performed by a medical physicist after purchase and prior to clinical use of the MRI system.**	
MR12.1.1	**M**	Acceptance testing procedures include an assessment and identification of the fringe fields. *Intent: At a minimum the 5 gauss line is defined. Additional fringe fields may be required depending on the conditional equipment used by the imaging service.*
MR12.1.2	**M**	Acceptance testing procedures include an assessment of magnetic field homogeneity.
MR12.1.3	**M**	Acceptance testing procedures include an assessment of RF shield integrity and ambient RF noise.
MR12.1.4	**M**	Acceptance testing procedures include an assessment of MR spectroscopy using a Braino Phantom or equivalent.

MR12.1.5	**M**	Acceptance testing procedures include an assessment of the system signal to noise ratio using the manufacturer's recommended settings.
MR12.1.6	**M**	Acceptance testing procedures include an assessment of signal uniformity of the body coil.
MR12.1.7	**M**	Acceptance testing procedures include an assessment of geometrical distortion.
MR12.1.8	**M**	Acceptance testing procedures include an assessment of geometric and positioning accuracy and gradient performance in all dimensions.
MR12.1.9		Acceptance testing procedures include a measurement of high contrast spatial resolution. *Guidance: An ACR phantom is required to perform this measurement.*
MR12.1.10	**M**	Acceptance testing procedures include an assessment of image quality and image artifacts.
MR12.1.11	**M**	Acceptance testing procedures include a check of table positioning accuracy.
MR12.1.12	**M**	Acceptance testing procedures include an assessment of each coil and establishment of baseline performance.
MR12.1.13	**M**	Acceptance testing procedures include an assessment of acoustic noise in and outside the magnet room.
MR12.1.14	**M**	Acceptance testing procedures include an assessment of MRI signal stability.

Accreditation Standards for Relocation Assessment

Diagnostic Imaging

MAGNETIC SAFETY

FACILITY DESIGN AND ACCESS RESTRICTIONS

MRS1.0 **The design of the facility and access restrictions minimize the potential hazards and risks associated with the magnetic field.**

MRS1.1		**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.*
MRS1.1.1	**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.*
MRS1.1.2		New facilities clearly mark zone IV with a red lighted sign stating “The Magnet is On.” *Guidance: Except for resistive systems, the signage is illuminated at all times and includes a battery backup energy source to continue illumination in the event of a loss of power to the facility.*
MRS1.1.3		All magnet rooms/zone IV regions include an emergency exhaust pathway in case of cryogen vent system failure or cryogen gas leak. *Guidance: The emergency exhaust grill should be positioned in the ceiling opposite the entrance to the magnet so that the exhaust fan draws the cryogenic gas away from the exit.*

MRS1.2		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.*
MRS1.2.7	**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.*
MRS1.2.9	**M**	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.*

SAFETY SCREENING

MRS2.0 The establishment of thorough and effective safety-screening guards the safety of all those preparing to enter Zone III.

MRS2.3	**Device and object screening is an effective component of MRI safety.**	
MRS2.3.1	**M**	All facilities have ready access to a strong handheld magnet (≥ 1000 gauss) or ferromagnetic detection system to supplement the thorough screening practice of the service. *Guidance: Conventional metal detectors are not permitted as they may not be able to differentiate between ferrous and non-ferromagnetic materials nor are they able to detect small, potentially dangerous metal fragments in or on the patient.*
MRS2.3.2	**M**	Handheld magnets are stored securely outside of zone III.

MRS3.0 Safety precautions prevent accidents and injuries in the MRI environment.

MRS3.1	**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 MR safe. 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.*
MRS3.1.5	**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.
MRS3.2	**Patient safety is monitored before, during and after a MRI examination.**	
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 all individuals remaining in the scan room during the examination.
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.
MRS3.3	**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.
MRS3.3.4	**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

MRS4.0 The MRI service has a comprehensive magnetic safety program.

MRS4.3	**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.*	
		Education is provided to:
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 fire fighter 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 *Guidance: Security staff only enter zone IV when level 2 personnel are in the facility to supervise.*

Accreditation Standards for Relocation Assessment

Diagnostic Imaging

NUCLEAR MEDICINE

IMAGING PROCEDURES

NM3.0 Standard protocols result in images and diagnostic data appropriate for their intended use in clinical decision-making.

NM3.3		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.

APPROPRIATE PHYSICAL ENVIRONMENT

NM6.0 The design and layout of the nuclear medicine service's physical space allows service delivery to be safe for patients and staff.

NM6.1		Nuclear medicine procedures are performed in an environment designed to ensure patient safety.
NM6.1.1	**M**	Therapeutic procedures are performed in locations with consideration for radiation safety precautions.
		Appropriate space is available for the following functions:
NM6.1.2		• "Hot" and "Cold" patient waiting areas
NM6.1.3	**M**	• "Hot" and "Cold" patient washrooms
NM6.1.4	**M**	• radiopharmaceutical preparation
NM6.1.5	**M**	• cell labeling

NM6.1.6		• administration of radiopharmaceuticals (e.g. injection)
NM6.2	**Exercise and/or pharmacologic stress testing is performed in a safe environment and according to established protocols.**	
NM6.2.7	**M**	There is an emergency crash cart immediately accessible.
NM6.2.8	**M**	An emergency drug tray is available in the room.
		The contents of the emergency drug tray include:
NM6.2.9	**M**	• nitroglycerine, in tablet or aerosol spray
NM6.2.10	**M**	• epinephrine
NM6.2.11	**M**	• atropine
NM6.2.12	**M**	• intravenous supplies
NM6.2.13	**M**	• parenteral antihistamine
NM6.2.14	**M**	• parenteral antiemetic
NM6.2.15	**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
NM6.2.16	**M**	• a beta-blocker (if performing pharmacological stress testing)

ACCEPTANCE TESTING AND QUALITY ASSURANCE

NM12.0 Equipment testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES 2.1.

NM12.1	**Acceptance testing is performed by a medical physicist after purchase and prior to clinical use of *gamma camera systems*.**	
		Acceptance testing includes an assessment of:
NM12.1.1	**M**	• multiple-window registration
NM12.1.2	**M**	• maximum count rate
NM12.1.3	**M**	• 20% loss count rate
NM12.1.4	**M**	• system sensitivity for each collimator
NM12.1.5	**M**	• pixel size calibration
NM12.1.6	**M**	• camera performance at high count rate

NM12.1.7	**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.*
NM12.1.8	**M**	• intrinsic and extrinsic spatial resolution *Guidance: A slit phantom (or equivalent) is used to assess the intrinsic and extrinsic (with collimators) spatial resolution.*
NM12.1.9	**M**	• tomographic uniformity reconstruction
NM12.1.10	**M**	• extrinsic uniformity *Guidance: An extrinsic (with collimators) uniformity flood is to be acquired for 30 million counts on all collimators routinely used to verify collimator integrity.*
NM12.1.11	**M**	• high count intrinsic uniformity, 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.*
NM12.1.12	**M**	• uniformity 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.*
NM12.1.13	**M**	• a Jaszczak or equivalent phantom reconstruction[16] *Guidance: An equivalent phantom is defined as a phantom recommended by the manufacturer, recognized by a national or international body (e.g. ACR, IAEA), or fabricated specifically for the gamma camera system and validated by a medical physicist.*
NM12.1.14	**M**	• tomographic resolution *Guidance: Perform a SPECT of capillary tubes to assess tomographic resolution*
NM12.1.15	**M**	• energy resolution *Guidance: Use the manufacturer's algorithm.*
NM12.2	**Acceptance testing is performed after purchase and prior to clinical use of *well counter systems*.**	
	Acceptance testing of well counter systems includes an assessment of:	
NM12.2.1	**M**	• crystal energy resolution
NM12.2.2	**M**	• linear geometry and sensitivity
NM12.2.3	**M**	• minimum/maximum detectable levels
NM12.2.4	**M**	• counting efficiency
NM12.2.5	**M**	• radionuclide window settings
	Acceptance testing of well counter systems includes:	
NM12.2.6	**M**	• a calibration using a reference standard

NM12.2.7	**M**	• a chi-square reproducibility test
NM12.2.8	**M**	• a normalization for multi-well systems
NM12.3	**Acceptance testing is performed after purchase and prior to clinical use of *uptake probe systems*.**	
	Acceptance testing of uptake probe systems includes an assessment of:	
NM12.3.1	**M**	• crystal energy resolution
NM12.3.2		• minimum/maximum detectable levels
NM12.3.3	**M**	• counting efficiency
NM12.3.4	**M**	• radionuclide window settings
	Acceptance testing of uptake probe systems includes:	
NM12.3.5	**M**	• a calibration using a reference standard
NM12.3.6	**M**	• a chi-square reproducibility test
NM12.4	**Acceptance testing is performed after purchase and prior to clinical use of *dose calibrator systems*.**	
	Acceptance testing of a dose calibrator system includes:	
NM12.4.1	**M**	• a geometrical sensitivity assessment
NM12.4.2	**M**	• a constancy assessment
NM12.4.3	**M**	• a linearity assessment
NM12.4.4	**M**	• an accuracy assessment
NM12.5	**Acceptance testing is performed after purchase and prior to clinical use of *SPECT/CT hybrid systems*.**	
NM12.5.1	**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.).
NM12.5.2	**M**	For SPECT/CT hybrid systems performing independent diagnostic CT, acceptance testing is performed according to CT 12.1 (CT12.1.1 – CT12.1.19).

Radiation survey meters

NM13.14		Quality control procedures are established and used to monitor radiation survey meters.
NM13.14.1	**M**	Radiation survey meter calibration is performed every 12 months by a qualified individual. *Guidance: The individual performing the calibration must have a documented procedure for calibrating the survey meter, the required equipment (e.g. jigs and calibration sources) and skills necessary to perform the calibration.*[17]

RADIOPHARMACY

NM14.0 The radiopharmacy is maintained in a manner that minimizes contamination.

NM14.2		Routine practices for preventing contamination in and outside the hot lab are implemented.
NM14.2.5	**M**	There are dedicated lab coats/gowns for white-cell labeling. *Intent: Lab coats/gowns used for white-cell labeling are not to leave the white blood cell room/area and are not to be used for other hot lab functions.*
NM14.2.6	**M**	White cell labeling is performed in a biological safety cabinet (BSC).

NUCLEAR MEDICINE RADIATION SAFETY

MINIMIZING RADIATION EXPOSURE TO STAFF AND VISITORS

NMRS1.0 Appropriate measures are in place to prevent unnecessary radiation exposure to staff and visitors.

NMRS1.3	**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 and emergency contact information is posted at the entrance of each room that may contain a source of ionizing radiation. *Guidance: Refer to the Government of Canada – Nuclear Substances and Radiation Devices Regulations "posting of signage" requirements accessible at http://laws-lois.justice.gc.ca/eng/regulations/SOR-2000-207/page-8.html?texthighlight=section+23#s-23.*
NMRS1.3.2	**M**	Access control signs (e.g. authorized personnel only) are posted in the areas where radioactive materials are stored and handled.

MINIMIZING RADIATION EXPOSURE TO PATIENTS

NMRS2.0 Appropriate measures are in place to prevent unnecessary radiation exposure to patients.

NMRS2.1	**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.

MANAGING RADIOACTIVE MATERIAL

NMRS3.0 Radioactive materials are safely managed.

NMRS3.1		Radiation safety is ensured when staff members handle radioactive materials.
		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

BONE DENSITOMETRY

IMAGING PROCEDURES

BD3.0 Standard protocols result in examinations appropriate for their intended use in clinical decision-making.

BD3.3	**Examinations are performed following established protocols.**	
BD3.3.1	**M**	Protocols are readily available to staff performing the examination.
BD3.3.3	**M**	Pediatric protocols are documented and available to staff.
BD3.4	**Protocols are in place for serial bone densitometry monitoring.**	
BD3.4.1	**M**	Serial examinations are performed with the same DXA system used for previous examinations. In situations where equipment has been changed or replaced, serial comparisons are **only** made after equipment cross-calibration has been performed.

EQUIPMENT

BD11.0 Equipment is safely operated, and maintained and monitored in a manner that ensures performance specifications are met.

BD11.1	**The imaging service ensures that equipment is capable of achieving the desired image quality and complies with the requirements of the examination.**	
BD11.1.1	**M**	The service has a height measuring device to accurately measure patient height. *Guidance: It is **strongly recommended** that the imaging service use a stadiometer for obtaining height measurements.*
BD11.1.2	**M**	The service has a device to measure patient weight to the nearest 0.1kg.

BD11.2	**The cross-calibration of bone densitometry equipment is performed according to standard protocols and prior to clinical use.**	
		A cross-calibration of the DXA system is performed when[18]: *Guidance: Cross-calibration requires the same technologist to perform ten (10) phantom scans, with repositioning, before and after a hardware change. If a greater than 1% difference in mean BMD is observed, the manufacturer must be contacted to perform additional calibrations/service.*
BD11.2.1	**M**	• changing hardware, but not the entire system
BD11.2.2	**M**	• replacing the DXA system with the same manufacturer and model using the same technology
		A cross-calibration of the DXA system is performed when[19]: *Guidance: Cross-calibration is performed by scanning 30 patients, representative of the patient population on the initial system, and then scanning each patient twice on the new system within 60 days. Calculate the average BMD relationship and LSC between previous and new system and use this LSC for comparison. Once a new precision assessment has been performed on the new system, all future scans should be compared to scans performed on the new system using the newly established intra-system LSC.*
BD11.2.3	**M**	• replacing the DXA system with one from the same manufacturer using a different technology
BD11.2.4	**M**	• replacing the DXA system with one from a different manufacturer
BD11.2.5	**M**	If a cross-calibration assessment is not performed, quantitative comparisons to the prior DXA system are not made. *Intent: Inter-system quantitative comparisons can only be made if a cross-calibration is performed for each skeletal site measured.*

ACCEPTANCE TESTING AND QUALITY ASSURANCE

BD12.0 Equipment acceptance testing is performed prior to clinical use.

See also Equipment and Supplies Accreditation Standards DES2.1.

BD12.1	**Acceptance testing is performed after purchase and prior to clinical use of equipment.**	
		Acceptance testing includes visual and functional testing of the:
BD12.1.1	**M**	• mechanical properties
BD12.1.2	**M**	• safety systems
		Testing includes an evaluation of the:
BD12.1.3	**M**	• radiation scatter
BD12.1.4		• radiation dose
BD12.1.5	**M**	• baseline BMD values and quality control thresholds using phantom scans

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