



# ASMIRT

2020

Australian Society of Medical Imaging and Radiation Therapy

## Policies & Procedures Manual Medical Imaging Practitioner Scope of Practice

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# Medical Imaging Practitioner Scope of Practice

For the purpose of this document, Medical Radiation Practitioners who perform medical imaging examinations will be identified as Medical Imaging Practitioners or MIP(s).

## **Introduction**

The broad Scope of Practice (SoP) for Medical Imaging Practitioners (MIPs) has been defined in the Professional Practice Standards (PPS)<sup>1</sup> by ASMIRT. The PPS describe the performance benchmarks for the Accredited Practitioner in Medical Imaging mirroring the professional standards set by the Medical Radiation Practitioners Board of Australia (MRPBA)<sup>2,3</sup> for all MIPs. The PPS provides a framework for professional, patient and community expectations. The PPS aim to integrate the skills, knowledge and understanding that underpin the profession of MIPs.

The PPS states the scope of practice of the MIPs (Accredited Practitioner level) shall include:

- Thorough knowledge of patient and clinical assessment, positioning and immobilisation
- Thorough knowledge of the principles, clinical application and performance of general, emergency and mobile radiography
- Thorough knowledge of the principles, clinical application and performance of fixed and mobile fluoroscopic systems
- Knowledge of the principles, clinical application of mammographic imaging
- Knowledge of the principles, clinical application of diagnostic angiography and interventional techniques
- Knowledge of the principles, clinical application and performance of routine Computed Tomography (CT)
- Knowledge of the principles, clinical application and performance of routine Magnetic Resonance Imaging (MRI)
- Knowledge of the principles, clinical application and performance of ultrasound imaging
- Application of knowledge of paediatric radiation safety principles and techniques in all areas of medical imaging
- Uses established criteria to assess that image quality is of an acceptable standard
- An appropriate knowledge of image interpretation
- Equipment being operated in an appropriate manner
- Understands and complies with quality assurance processes
- Knowledge of monitoring and care of the patient
- Knowledge and clinical applications of all medical imaging modalities
- Mentoring, clinical reasoning and research.
- Quality assurance and quality improvement

The purpose of this review was not to replace the PPS but to describe a broader set of tasks undertaken by MIPs to supplement the PPS principles and reflect contemporary practice and the role MIPs undertake in the delivery of radiation and imaging services in Australia. The focus is on articulating the daily tasks, responsibility and accountability of MIPs within their professional environment.

The MIP role spans a diverse range of technical expertise, complex clinical expertise, clinical patient management, clinical informatics, coupled with radiation safety considerations<sup>4</sup>.

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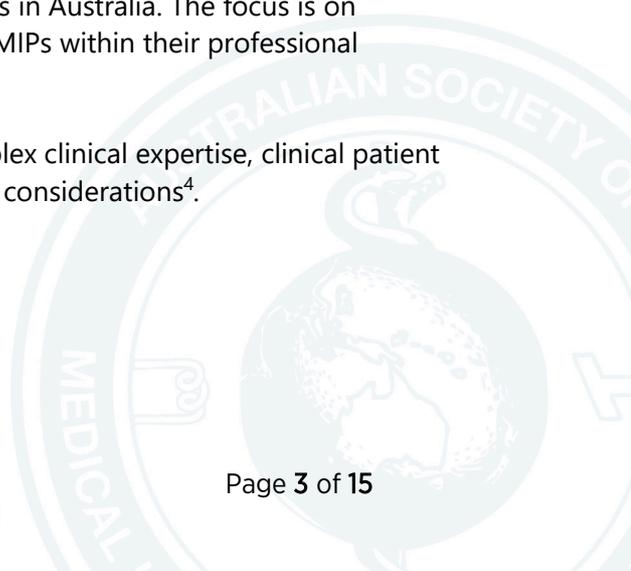
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MIPs are both registered and licenced practitioners which requires them to hold the equivalent of a “User Licence” in the State and some Territories in which they practice<sup>2,5</sup>. They are aware of and comply with legislative requirements and have a culture of implementing monitoring procedures and quality assurance processes as well as incident reporting and review to ensure that the public and patients are safe.

MIPs are responsible for the safe and accurate delivery of diagnostic doses of radiation to patients. In order to achieve this, MIPs are trained in principles of radiation physics, anatomy, pathology and physiology, as well as general patient care issues such as infection control and workplace health and safety. Radiation safety principles and practice are also an essential part of an MIPs education<sup>4</sup>.

There are core clinical responsibilities identifiable within the modern-day contemporary MIP role. These span a diverse range of responsibilities in their daily role, including;

- Inter and Intra professional communication
- Professionalism
- Patient Care
- Patient Positioning
- Radiation Dose / ALARA principal (including diagnostic reference levels)
- Radiation Physics
- Image Acquisition, Quality and Interpretation
- Quality Assurance
- Research and clinical practice improvement
- Education

These responsibilities have been distilled into the sections below that represent broad areas of practice. The details are not meant to be prescriptive or limit the scope of practice in any way. It is acknowledged that diagnostic medical imaging is a continually evolving field that requires an adaptable and flexible workforce. It is also acknowledged that there will be some overlap with other groups within the multidisciplinary team and those responsibilities / tasks will vary between jurisdictions, but optimal service delivery occurs in a collegial environment where all members of the team are respected, and their contributions valued. MIPs are regulated and licensed practitioners who carry a critical responsibility for diagnostic imaging service delivery and are essential to quality care.

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## **Principles and Clinical Application of General / Emergency / Mobile Radiography**

The production of these images, known as digital radiographs, represent the vast majority of all medical imaging techniques performed within the Australian healthcare system.

MIPs are responsible for the image production to enable a clinical diagnosis to be made, as part of the model of holistic patient care. This requires them to have expert knowledge of radiographic principles including radiation dose and patient positioning, within the capabilities and constraints of this technology<sup>4</sup>.

They should also have extensive knowledge of digital imaging transfer within a Picture Archiving Communication System (PACS) environment, as well as archiving processes which lead to retrieval of images, diagnostic confirmation and comparison.

MIPs are responsible to review the clinical history, referral and current medical information to confirm that the requested procedure is justified, as well as determining the optimal imaging protocols, and adapting the requested examination considering available clinical information,<sup>4</sup> for accurate image diagnosis.

MIPs should identify factors or conditions that may affect the patient's capacity to undergo the examination, as well as, identify patients who are most at risk (including pregnant women, breast feeding mothers and accompanying children). They should also demonstrate knowledge of patient preparation requirements. They should identify contraindications and limitations of these services and communicate these to the patient.<sup>4</sup>

Good verbal and non-verbal communication are required to help put patients at ease. The ability to reassure the patient, answer questions and allay their fears is paramount to relaxing the patient.

## **Principles and Clinical Application of Fluoroscopy in the Imaging Environment**

The production of fluoroscopic images on fixed and mobile fluoroscopy units, are performed by MIPs within a variety of environments, namely medical imaging departments, operating theatre suites, and day procedure units.<sup>4</sup>

The MIP should have the ability to apply knowledge pertaining to patient preparation and patient care in this environment, as well as a complete knowledge of aspects of radiation safety, and any potential radiation issues which may arise within a multidisciplinary team environment. A thorough understanding of the delivery systems for contrast examinations is essential.<sup>4</sup>

It is also acknowledged that the acquired images will form part of a "real-time" examination or procedure which may be conducted with other groups within the multidisciplinary team environment and those responsibilities / tasks will vary between jurisdictions, but optimal service delivery occurs in a collegial environment.

They should also have extensive knowledge of digital imaging transfer within a PACS environment, as well as archiving processes which lead to retrieval of images, diagnostic confirmation and comparison.

MIPs are responsible to review the clinical history, referral and current medical information to justify that the requested procedure is optimal.<sup>4</sup> Good verbal and non-verbal communication is required to ensure the optimal functioning of the examination or procedure within a multidisciplinary team, as well as helping place the patient at ease, while gaining their full cooperation.

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## Principles and Clinical Application of Mammographic Imaging

Mammographic imaging is the primary form of breast imaging, in both a clinical and screening setting in the Australian healthcare system predominately for adult females and to a lesser extent, adult males.

MIPs are responsible for the image production to enable a clinical diagnosis to be made, as part of the model of holistic patient care. This requires them to have expert knowledge of mammographic positioning including radiation dose within the capabilities and constraints of this technology.

MIPs are responsible to review the clinical history, referral and current medical information to confirm that the requested procedure is justified, as well as determining the optimal imaging protocols, and adapting the requested examination considering available clinical information,<sup>4</sup> for accurate image diagnosis.

MIPs should be aware of complementary imaging techniques, which may be required to resolve any equivocal clinical mammographic diagnosis. They should also have extensive knowledge of digital imaging transfer within a PACS environment, as well as archiving processes which lead to retrieval of images, diagnostic confirmation and comparison.

MIPs should understand and undertake routine QA testing on mammography equipment and be familiar with protocols and procedures required for QA testing.

Excellent verbal and non-verbal communication is required to ensure the optimal functioning of the examination or procedure within a multidisciplinary team, as well as helping place the patient at ease, while gaining their full cooperation.

## Principles and Clinical Application of Diagnostic Computed Tomography (CT) Imaging

The production of diagnostic Computed Tomography (CT) images, while highly sophisticated, is one of the most commonly performed examinations of all medical imaging techniques within the Australian healthcare system. It is also the modality which produces the highest radiation doses in diagnostic medical imaging.

All MIPs are initially trained in the use and workings of a CT scanner and the associated image interpretation, within their under-graduate university program. Further training and experience is then acquired within the clinical setting from clinically experienced CT radiographers preferably with a post-graduate qualification in this modality. A knowledge of radiation physics, anatomy physiology and pathology enables the MIP to select the most appropriate protocol for the particular examination and /or procedure with adherence to the ALARA principle. CT protocols for each different body site for both adults and paediatrics are developed and peer reviewed by the MIP in conjunction with Radiologists and Qualified Medical Physics Specialists (QMPS). Quality assurance of the CT scanner is the responsibility of the MIPs and any deviations will be reported to a QMPS for further investigation.

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MIPs can perform and evaluate unenhanced and contrast enhanced examinations of the body and if appropriate, modify them to take into account the patient's presentation and associated clinical indications.<sup>4</sup>

MIPs must have the ability to apply knowledge of post-processing techniques, including multi-planar reformats and volumetric imaging.<sup>4</sup> They should also have extensive knowledge of digital imaging transfer within a Picture Archiving Communication System (PACS) environment, as well as archiving processes which lead to retrieval of images, diagnostic confirmation and comparison.

Where contrast media is used, the MIP must have knowledge of the primary reason as to why it has been administered. Contrast may be given orally or intravenously and include different types of contrast and varying dose amounts, with knowledge of specific contrast timing in CT acquisition<sup>4</sup> and that dose amounts will vary between adults and paediatrics. Appropriate training can also allow the MIP to perform cannulation for CT imaging. The MIP must be able to recognise an anaphylactic reaction and initiate the appropriate emergency response.

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## Principles and Clinical Application of Diagnostic Angiography and Interventional Techniques

The acquisition of fluoroscopic and angiographic images for therapeutic clinical interventions are performed by MIPs within a variety of environments, namely medical imaging departments, operating theatre suites, and day procedure units.

MIPs are required to have knowledge of the use, its design and operation of all forms of angiography systems and associated consumables such as contrast media and their delivery systems, diagnostic catheters and interventional requirements.

MIPs should be able to have an extensive knowledge of angiographic anatomy, which can be applied to both diagnostic and interventional procedures within a multidisciplinary team environment. They should also have a clear understanding of angiographic image acquisition, image registration, as well as all forms of post processing options.<sup>4</sup>

They should also have extensive knowledge of digital imaging transfer within a Picture Archiving Communication System (PACS) environment, as well as archiving processes which lead to retrieval of images, diagnostic confirmation and comparison.

The MIP should have the ability to apply knowledge pertaining to patient preparation and patient care in this environment, including aseptic techniques.<sup>4</sup> MIPs are required to have a complete knowledge of aspects of radiation safety, and any potential radiation issues which may arise within a multidisciplinary team environment. A thorough understanding of the delivery systems for contrast examinations is essential.<sup>4</sup>

## Principles and Clinical Application of Magnetic Resonance (MR) Imaging

The production of diagnostic Magnetic Resonance (MR) images, which are regarded as highly sophisticated, are acquired by the manipulation of radiofrequency and gradient magnetic fields and the application of static magnetic fields. These images are not acquired by the use of ionizing radiation. Consequently, image acquisition is the domain of MIPs and other registered MR healthcare professionals and healthcare workers.

Those MIPs who work in this field, should demonstrate an extensive knowledge of MR image production and acquisition as well as MR pulse sequences and MR image artefacts. Extensive knowledge of MR safety hazards pertaining to static magnetic fields, gradient magnetic fields and radiofrequency magnetic fields is also required. The MIP should be aware of the projectile danger of the static magnetic fields to patients, MRI staff, non-MRI staff, patients and the general public. An understanding of the effects of gradient magnetic fields of acoustic noise and peripheral nerve stimulation hazards and the effects of radiofrequency magnetic fields of heating and thermal burns hazards are required.

The MIP should have ability to understand and carry out prescribed protocol applicable to all MR examinations, for both adult and paediatrics, and should also have adequate knowledge of patient positioning, patient immobilisation as well as coil selection for image acquisition.

MIPs are responsible to review the clinical history, referral and current medical information to confirm that the requested procedure is appropriate clinically, and to evaluate the safety of MR scanning for patients, particularly in relation to implanted devices. This is to be performed in consultation with the supervising MRI radiologist.

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Good verbal and non-verbal communication are required to ensure the optimal functioning of the examination or procedure within a multidisciplinary team, as well as helping place the patient at ease, while gaining their full cooperation. This in conjunction with an understanding of patient anxiety and claustrophobia along with techniques to assist patients who are claustrophobic is required.

They should also have extensive knowledge of digital imaging transfer within a Picture Archiving Communication System (PACS) environment, as well as archiving processes which lead to retrieval of images, diagnostic confirmation and comparison.

Where contrast media is used, the MIP must have knowledge of the primary reason as to why this is being administered. Contrast is usually given intravenously, and appropriate training can also allow the MIP to perform cannulation. It should be noted that dose amounts will vary between adults and paediatrics. The MIP must be able to recognise an anaphylactic reaction and initiate the appropriate emergency response.

### **Principles and Clinical Application of Ultrasound Imaging**

While it is recognized that the production of ultrasound imaging, falls under the domain of sonographers who are accredited (or who are obtaining accreditation) under the auspices of the Australian Sonographers Accreditation Registry (ASAR), the MIP should have knowledge of the principles and clinical application of ultrasound imaging.

The MIP have an understanding of the principal of physics pertaining to ultrasound image production, as well as knowledge of ultrasound examinations, which may include obstetrics, the abdomen, vascular, superficial (small) parts as well as paediatric imaging.

It is also desirable that the MIP should be able to understand what is required in terms of patient preparation, and the complimentary imaging relationship which ultrasound imaging has in relationship to other diagnostic imaging examinations.<sup>4</sup>

They should also have extensive knowledge of digital imaging transfer within a Picture Archiving Communication System (PACS) environment, as well as archiving processes which lead to retrieval of images, diagnostic confirmation and comparison.

### **Quality and Safety**

The MIP perform their duties in conjunction with other responsible professionals, such as Qualified Medical Physics Specialists (QMPS) and are responsible for several quality assurance processes. Quality control processes are performed on equipment, measuring performance and specifications against expected standards. Once measured, the MIP is responsible for ensuring the quality standards have been met and maintained, or alternatively making decisions in conjunction with a QMPS on appropriate actions for out-of-tolerance parameters.

MIPs in conjunction with QMPS, make a leading contribution in the introduction of any new technology, participating in risk assessments and the development of quality processes to ensure that new equipment or techniques are safely integrated into a department. There are areas where the MIP demonstrates their commitment to continuous quality improvement including:

- The development and maintenance of department protocols and procedures that document quality standards

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- Participation in audits and other tools to verify compliance with protocols, and measure quality
- Contributing to incident monitoring and process risk management
- Maintenance of performance and competency standards
- Undertaking quality improvement activities that are evidenced based and follow recognised processes

MIPs provide a continual quality improvement approach in clinical care. This quality improvement analysis advances technique developments, research efforts and drives constant evolution of medical imaging practice.

As a regulated and licensed practitioner, the MIP complies with radiation safety legislation and its application in daily practice.<sup>1,2</sup>

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## Research and Development

Medical imaging is a continually evolving field, and the MIP is integral to ensuring that new and emerging imaging techniques are introduced with sound evidence-based practices. With a collaborative research and development approach, the Medical Imaging Practitioner is responsible for ensuring good clinical practice principles are utilised in research involving:

- The introduction of new technologies
- The development of new imaging techniques
- Clinical trials investigating the efficacy of new therapy regimes

The MIP can be integrated with different levels of research within Medical Imaging. Research can be large scale clinical trial type research or smaller scale implementation research. MIPs can be involved at many levels; as a significant contributor and /or at the periphery of these research efforts. The MIP in research may include the following roles:

- Investigator, with responsibility for the study including protocol development, ethics submissions and ensuring protocol compliance
- Co-investigator, participating in data collection and results analysis
- Clinical trial credentialing and protocol compliance

MIPs involved in research have opportunities (and an expectation / obligation) to contribute to the ongoing development of medical imaging both nationally and internationally, through presentation and publication of research results and conclusions.<sup>1,3,4,6.</sup>

## Education

MIPs participate in many aspects of education including;

- Continuous development of own skills and professional knowledge
- Training of students and graduate practitioners
- Guiding the learning of other professionals in a multidisciplinary environment, including Radiologists, Nurses and QMPS
- Contributing to guidelines and protocols within a medical imaging environment

## Continuing Professional Development (CPD)

MIPs are licensed and regulated practitioners who are required to demonstrate recency of practice and undertake CPD on a continual basis to maintain registration with the MRPBA.<sup>3,7</sup> Educational opportunities for MIPs are many, with greatest benefit derived when recorded and reflected upon thoroughly in a continuing professional development (CPD) portfolio. These educational opportunities can be categorised as per the list below:<sup>8</sup>

- Skill-development / Workplace learning
- Self-directed learning
- Professional Activity / Organised program
- Conference and Meetings
- Audit and QA
- Writing
- Formal Education
- Research and Publication

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- Other

MIPs are responsible to commit to, and partake in, lifelong learning relevant to the profession throughout their careers.<sup>1,3,6</sup> Continually reflecting on own practices and identifying and acknowledging limitations in their professional knowledge is an essential step to ensure the maintenance of the highest standard of knowledge, skill and attitude required in a MIP position.

To keep current with new department procedures, trends and evolving technologies in contemporary practice, MIPs may employ various strategies for continually developing knowledge and skills to meet department and personal goals. MIPs regularly participate in professional development learning by attending mandatory training courses (first aid, CPR and manual handling), department in- services, patient case review sessions and completing activities which advance the profession. When new equipment is installed, MIPs receive applications training and become responsible to meet department standards in this modality.

### **Education and training of students and graduate practitioners**

All MIPs play a vital role in the education and training of students and graduate practitioners. They continually support and mentor students and graduates to work appropriately to gain maximum experiences from procedures they undertake. MIPs provide experiential learning opportunities which are relevant to the stage of education and experience and give students and graduates valuable time and practice to build upon their problem-solving skills.<sup>1,3</sup>

The co-ordination of MIP student's learning is managed by a MIP who may be in a dedicated clinical educator role. This includes rostering students to a variety of areas within medical imaging, ensuring constructive and timely feedback is given regularly throughout the process. Helping students set specific achievable goals and educational outcomes for their placements which meet university expectations, is another task that MIPs are involved in.

In clinical practice, MIPs recognise the importance of role modelling expected behaviours and attitudes when delivering quality patient care services. This MIP trait is paramount especially when developing the next generation of MIP professionals for the future.<sup>6</sup>

### **Guiding the learning of others**

MIPs contribute to learning experiences and professional development of others, most frequently their imaging colleagues, radiologists, QMPS and nursing staff. The role of the registered MIP is to disseminate their knowledge, experience and expertise to their colleagues, health professionals from other disciplines and promotion of the profession to the wider community.<sup>1,4,6</sup>

Contributions can be formal and informal educational opportunities involving colleagues and peers, and inclusive of patients. MIPs regularly take part in multidisciplinary education sessions which are often delivered after hours to show case medical imaging to like-minded professionals.

MIPs are involved in the creation of a variety of educational materials (e.g. online training material/resources, journal articles, textbooks and other publications) which can be utilised by their colleagues to gain additional knowledge directly from the profession.

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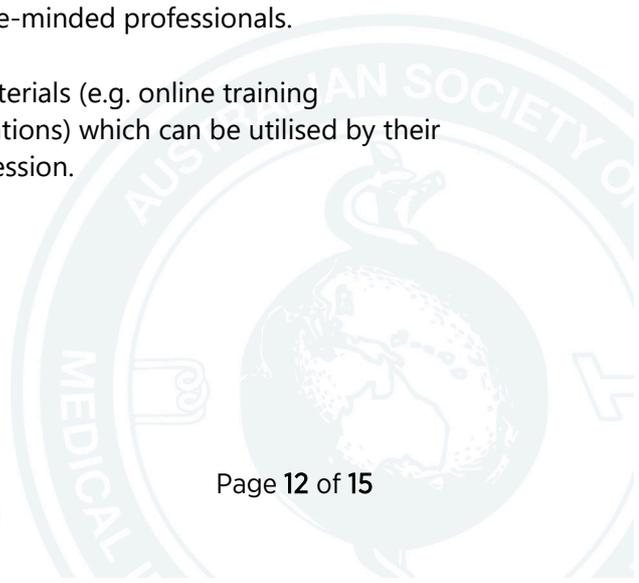
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## Radiology Information Systems Management

Radiology information systems (RIS) are utilised for the recording of patient demographics, disease information and medical imaging data, pertaining to the patient's electronic medical record. Data from the RIS informs audit, research and statistical data as well as assisting in ensuring that key performance indicators are met. This electronic health record is integral to the delivery of medical imaging. MIPs are responsible for importing, entering and recording medical imaging data completely and accurately in the RIS.<sup>1</sup>

MIPs are frequently engaged in key applications roles to manage, support and develop the RIS. In many organisations, a Medical Imaging Practitioner is the system administrator for the RIS.

## Advanced Practice / Role Expansion – Extending the Scope of Practice

The roles and responsibilities outlined above represent the core duties for MIPs. The scope of practice is not limited to these tasks however, and there are numerous areas where the scope is extended to include patient focussed tasks in conjunction with other Medical Imaging professions. This advanced practice or role expansion may be a natural progression where MIPs training and expertise allows them to take on extra duties to expand and/or improve efficient delivery of patient care.

ASMIRT defines an Advanced Practitioner “as a professional who fulfils all aspects of the expectations for the ASMIRT Certified Practitioner and, additionally, demonstrates expertise across seven dimensions of practice, and is able to provide evidence of their advanced capability in each dimension. While the dimensions of practice are described individually, the Advanced Practitioner recognises their practice as holistic and is able to draw appropriately upon all aspects of their expertise to provide optimal, expert, contextual patient care.”<sup>9</sup>

The seven dimensions of practice are;

- Clinical Leadership
- Evidenced-based judgement
- Clinical Expertise
- Scholarship & Teaching
- Professionalism
- Communication
- Collaboration

Advanced Practice should be supported by comprehensive training, educational underpinning and be evidence based. Education providers have recognised this need and developed tertiary level courses to support Advanced Practitioners. The responsibilities associated with the advanced practice role should be clearly defined, described, formalised and documented in the individual's workplace. Advanced practice roles should be supported with the necessary time, resources and recognition from local management to ensure that the Advanced Practitioner is able to fulfil their clinical responsibilities. The Advanced Practitioner should also be supported by a readily accessible Clinical Mentor in the workplace, who is an appropriate/relevant leader in the advanced scope of practice, often a medical specialist or physics specialist.

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## Glossary / Abbreviations

ALARA	As Low As Reasonably Achievable
AHPRA	Australian Health Practitioner Regulation Agency
ASAR	Australian Sonographers Accreditation Register
ASMIRT	Australian Society of Medical Imaging and Radiation Therapy
CPD	Continuing Professional Development
CT	Computed Tomography
MR	Magnetic Resonance
MRI	Magnetic Resonance Imaging
MRPBA	Medical Radiation Practitioners Board of Australia
PACS	Picture Archiving Communication System
PPS	Professional Practice Standards
RIS	Radiology Information System
QMPS	Qualified Medical Physicist Specialist
SoP	Scope of Practice

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