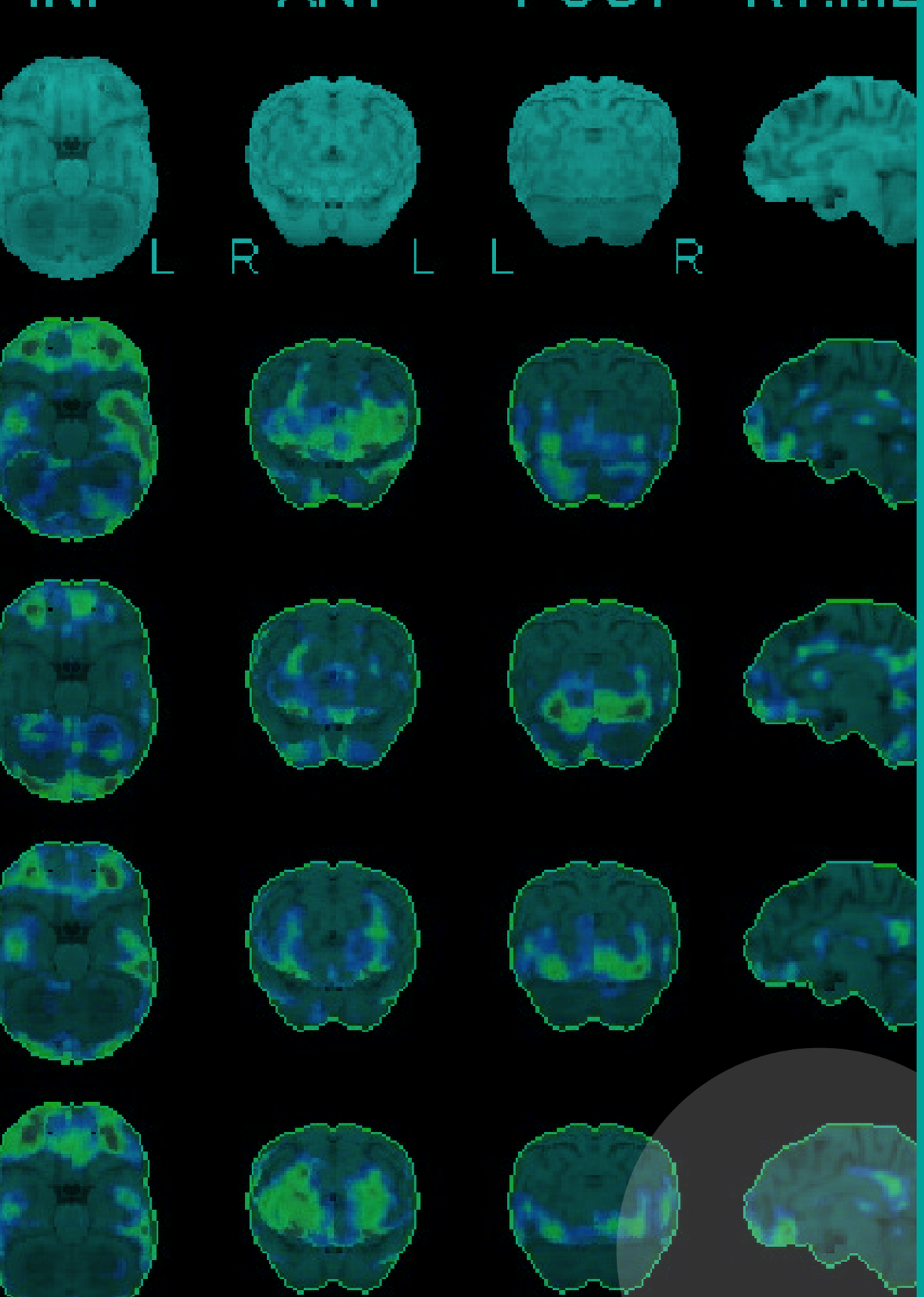
ACPSEM
Australasian College of Physical Scientists & Engineers in Medicine

TRAINING EDUCATION & ASSESSMENT PROGRAM (TEAP) HANDBOOK

DIAGNOSTIC IMAGING MEDICAL PHYSICS (DIMP)



CONTENTS

TRAINING PROGRAM OVERVIEW

Training Program Overview

THE ACPSEM DIMP TEAP CONSISTS OF SEVERAL KEY COMPONENTS:

DEGREE PROGRAM

An ACPSEM accredited postgraduate degree program in medical physics (Australian Qualification Framework level 9).

This may be completed either during or prior to enrolment in the DIMP TEAP.

If completed during DIMP TEAP, additional time will be added to the overall program length to compensate.

CLINICAL TRAINING

Clinical-based training and education conducted at an ACPSEM-accredited training site.

This component of the DIMP TEAP is 3 years full-time equivalent (FTE) in length.

EXTERNAL ASSESMENT

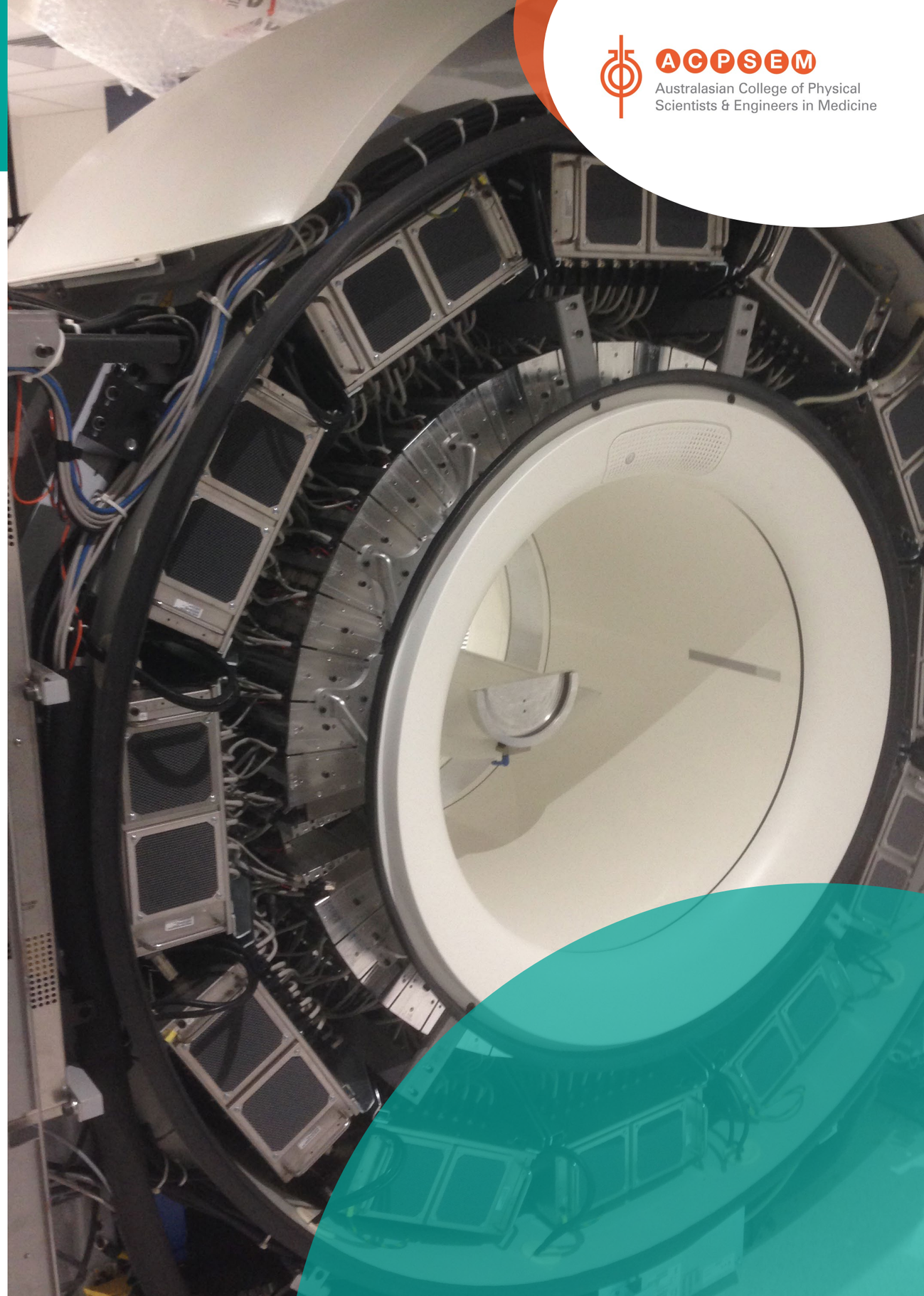
Successful completion of external assessment components, which include:

- Written and oral examinations
- Formal presentation of research/development work at a recognised medical physics conference
- Completion of 3 Clinical and Scientific Reports

PROGRAM OUTCOME STATEMENTS

The DIMP TEAP curriculum framework has been created around a series of graduate Program Outcome Statements (POSs) that reflect the attributes that graduates of the DIMP TEAP should display when certified, and then further develop throughout their professional careers. These POS are available on the ACPSEM website. Each learning outcome in the Curriculum Framework links to at least one of these graduate program outcome statements and all program outcome statements are covered across multiple learning outcomes, apart from CPD as this is not currently mandatory in the ACPSEM TEAP. Supervisors and registrars should have an awareness of the POSs as they underpin the curriculum and training program.

Each learning outcome in the Curriculum Framework links to at least one graduate program outcome statement and all program outcome statements are covered across multiple learning outcomes.



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STAGES OF CLINICAL TRAINING

Stages of Clinical Training

TEAP is a three-year (36-month FTE) program. Entry into TEAP is based on eligibility criteria and selection tools. The clinical training component of DIMP TEAP in a single speciality is 3 years. This is ***in addition*** to the time required to complete any required post-graduate university study. Entry into TEAP is based on fixed eligibility criteria and selection tools, with clinical training to occur at an ACPSEM accredited training site under the management of an ACPSEM approved supervisor.

There are three stages of training. Stage A (Introduction), Stage B (Core) and Stage C (Consolidation). Each stage is anticipated to take 12 months FTE, although progression between stages can occur at other times, depending on registrar progress.

Within each stage, there are:

Hurdle Requirements, which must be completed before the registrar is eligible for progression.

Evidence Requirements, which must be collated in each stage.

Ad hoc Learning Opportunities, which are not mandatory, and the ones listed are only examples with the expectation there will be others.

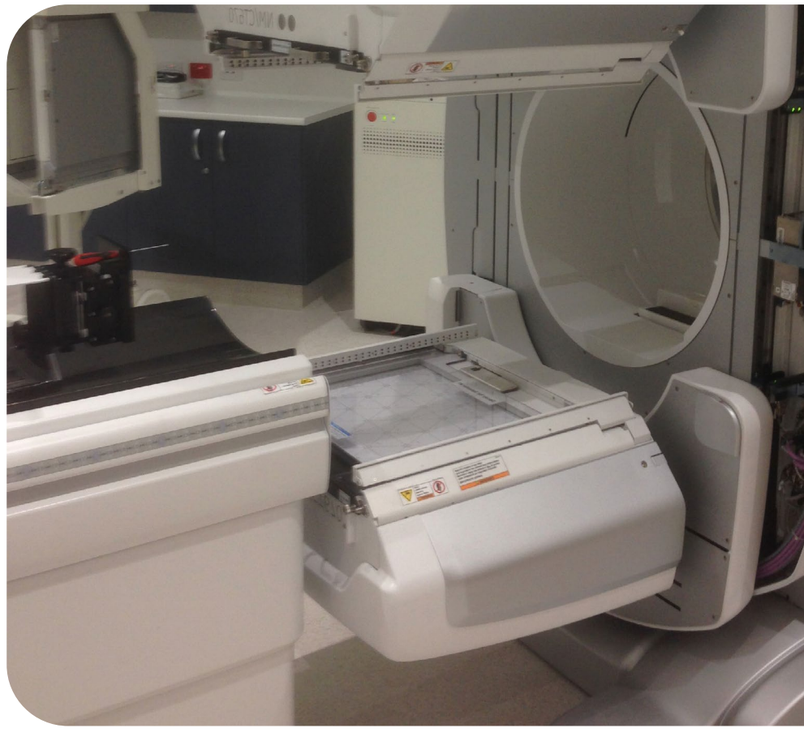
Structured Learning Activities (SLAs), which develop competence against a Learning Outcome.

Many of the Evidence Requirements and SLAs are specifically mapped to Learning Outcomes, and the satisfactory completion of the assessment task of SLA allows the registrar to attain a Learning Outcome (LO).

Progression from Stage A to B, Stage B to C, and Stage C to completion (Certification) is a high-stakes decision by the relevant committee. The committee must review all submitted evidence and requirements and make an informed decision.

Registrars have flexibility in the attainment of LOs, and especially in the order in which they are undertaken. This recognises the variation in training sites and contexts. However, registrar progress is monitored to ensure that training can be completed in 36 months.

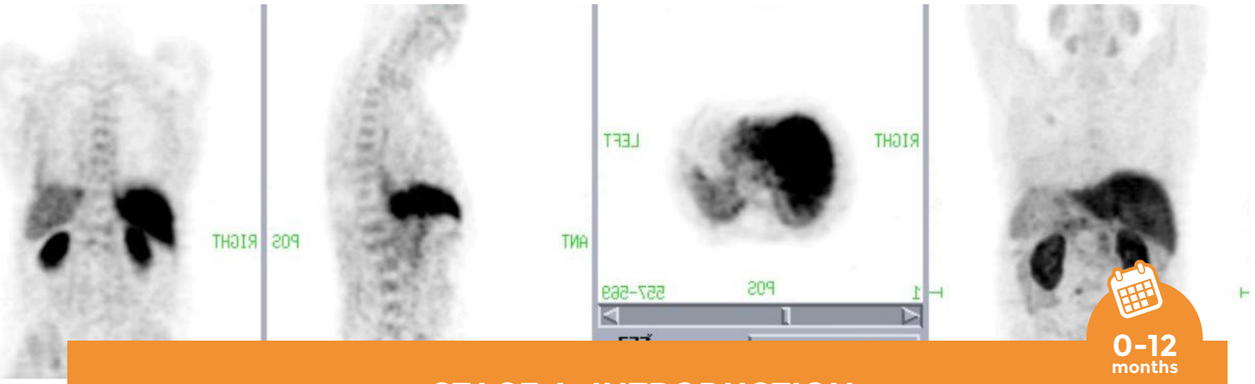
To complete Stage A of training, the registrar must complete all LOs in Key Area (KA) 1, 2 and 3. The non-specialty specific KA7 LOs must also be complete. The registrar shall also have commenced attaining Learning Outcomes in KA4 and 5 (this means at least one Learning Outcome in each of these Key Areas must have been attained).



For KA1, the LOs covered are largely taught as part of an ACPSEM accredited Masters course. Registrars who believe they meet the learning outcomes for this key area as a result of their prior learning may apply to take the KA1 MCQ quiz to demonstrate this knowledge. Only one attempt at the quiz will be allowed. Passing the quiz will result in all learning outcomes being graded as complete for the key area. Failing the quiz will require providing evidence of meeting all the learning outcomes for the area.

To complete Stage B of training, the registrar is required to complete all LOs in KA7, and topics: 4.1, 4.3, 4.4, 5.1 (excluding specialty-specific), 6.2. All Entrustment Activities for KA8 and KA10 need to be at Level 2 (refer to page 27 for further detail). The registrar should also have commenced attaining the LOs in remaining KAs.

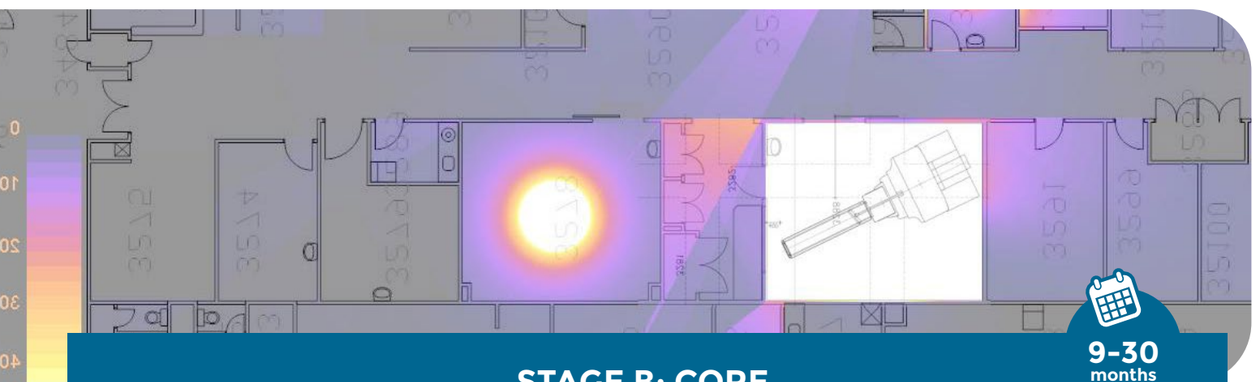
Stages of Clinical Training



0-12 months

STAGE A: INTRODUCTION

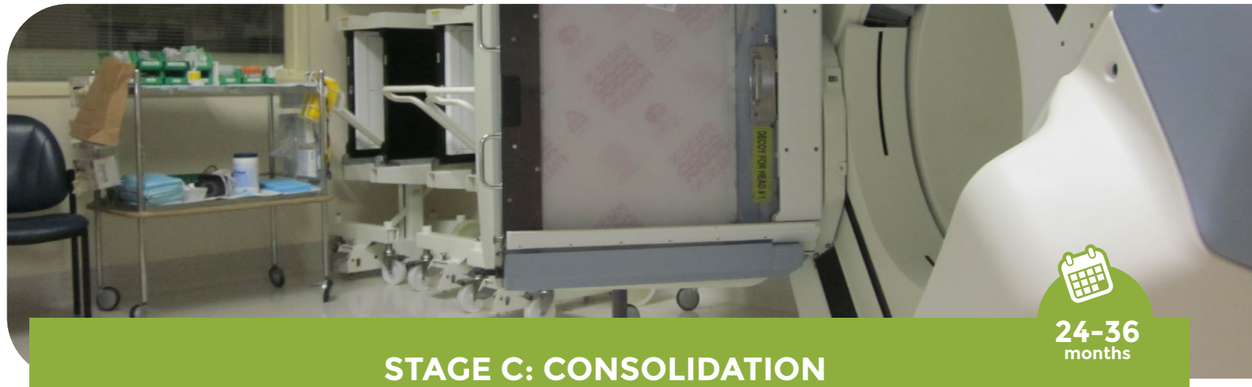
In this stage most registrars are entering the world of the health professional for the first time. As part of this, there are key induction items that must be completed to appropriately initiate registrars around the expectations and role of radiology and nuclear medicine medical physicists in the clinical environment. Along with relevant theoretical education, it is expected registrars will be undertaking clinical work in this stage; however most will require significant supervision when doing so initially. Registrars will transition to a greater level of independence in routine work and begin to play a role in departmental projects.



9-30 months

STAGE B: CORE

In this stage registrars are beginning to gain confidence and should be able to be rostered to simple routine tasks under minimal supervision. Theoretical education in key areas (dosimetry and detriment, radiation safety and protection, technology used in diagnostic imaging) that commenced in Stage A should be completed in this stage. The "usefulness" of the registrar to the department will increase during Stage B as the registrar becomes more proficient in routine work and will learn how to lead small projects and be a functional member of larger projects.



24-36 months

STAGE C: CONSOLIDATION

In this stage registrars should be competent to complete tasks under general non-direct supervision and be able to use their knowledge to problem-solve unusual clinical scenarios. Registrars in this stage must have the ability to recognise when they are out-of-their-depth and know how/where to look for help and guidance (e.g. key best practice documents), which underpins the foundation of a safe, independent clinical medical physicist. It is during Stage C that the Registrar ultimately transitions to being a fully functional radiology medical physicist or nuclear medicine medical physicist in their department.

There are three stages of training. Stage A (Introduction), Stage B (Core) and Stage C (Consolidation). Each stage is anticipated to take 12 months FTE, although progression between stages can occur at other times, depending on registrar progress.

Diagnostic Imaging Medical Physics (DIMP) Training Education & Assessment Program (TEAP) Summary

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Continuing professional development, transition to ongoing professional practice

Certification (or further training / remediation) (high-stakes committee decision)

Stage C: Consolidation (months 24 – 36) approx. 12-month duration

24-36 months

Stage C:

Structured Learning Activities	Reflective practice, Formal Reports, Presentations, Equipment Testing, Radiation Monitoring, Stakeholder communication
***Ad hoc* Learning Opportunities**	All ad hoc learning opportunities are recommended
Evidence Requirements	Routine evidence, Written & Oral Assessments, Practical activities, Entrustment activities, Periodic Progress Review (PPR)
Hurdle Requirements	Report C, Written & Oral Exam, all Learning Outcomes attained (within speciality)

Progression (high-stakes committee decision)

Stage B: Core (months 9 – 30) approx. 12-month duration

9-30 months

Stage B:

Structured Learning Activities	Reflective practice, Formal Reports, Presentations, Equipment Testing, Radiation Monitoring, Stakeholder communication
***Ad hoc* Learning Opportunities**	All ad hoc learning opportunities are recommended
Evidence Requirements	Routine evidence, Written & Oral Assessments, Practical activities, Entrustment activities, Periodic Progress Review (PPR)
Hurdle Requirements	Report B, All KA7 Learning Outcomes attained, and for topics: 4.1, 4.3, 4.4, 5.1 (excluding specialty specific), 6.2. Commenced KA9. All Entrustment Activities for KA8 and KA10 need to be at Level 2.

Progression (high-stakes committee decision)

Stage A: Foundation (months 0 – 12) approx. 12-month duration

0-12 months

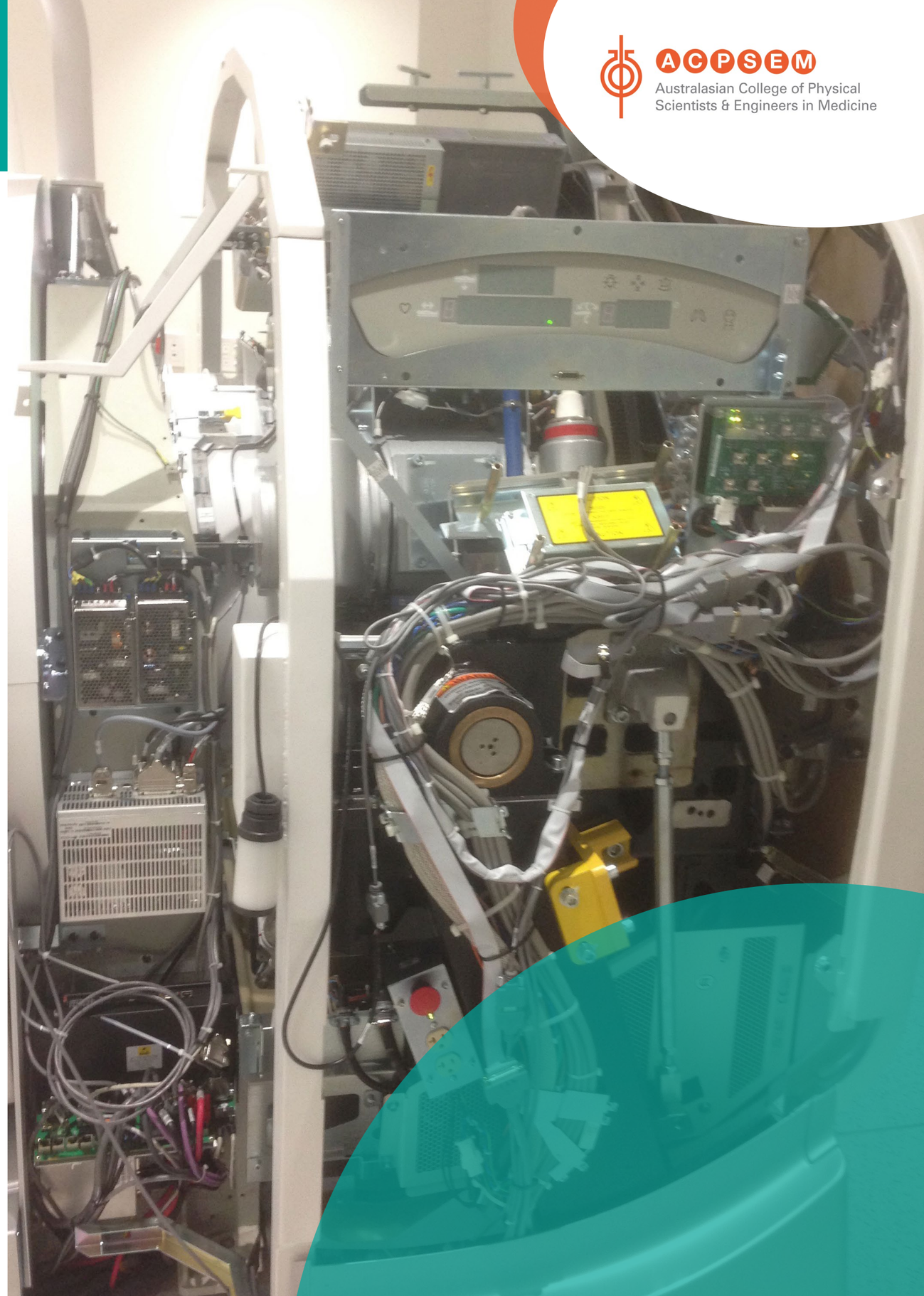
Stage A:

Structured Learning Activities	Required readings, literature reviews, reflective practice
***Ad hoc* Learning Opportunities**	Informal discussions, recommended readings, tutorials, journal club
Evidence Requirements	Routine evidence, Written & Oral Assessments, Practical activities, Entrustment activities, Periodic Progress Review (PPR)
Hurdle Requirements	Report A, MCQ exam, All KA1-3 LOs attained, Non-specialty specific KA7 LOs attained, KA4 and 5 commenced, Confirm Specialty

Entry into DIMP TEAP
Eligibility criteria & selection tools

Increasing Competence

Figure 1: Diagrammatic summary of the DIMP TEAP requirements



EDUCATION AND ASSESSMENT FRAMEWORK

A PROGRAMMATIC APPROACH TO ASSESSMENT

The ACPSEM is aiming to achieve increased assessment standardisation, facilitate tracking of registrar progress, and to reduce any unnecessary, non-meaningful and burdensome assessment. The ACPSEM aims to achieve this through the application of a model of programmatic assessment that applies a holistic view of performance across multiple assessment data points. This model recognises that as competency develops over time, assessment information is gathered in a progressive way, incorporating multiple assessments by multiple assessors. The new model will ensure all available information is gathered and reported to measure competence, progression, and the achievement of Learning Outcomes.

In programmatic assessment, the design and utility of the assessment program as a whole is emphasised, rather than focusing on the adequacy of individual assessments of performance (van der Vleuten & Schuwirth, 2005). This is because a program of assessment recognises that assessing complex competencies requires a range of measures and cannot be adequately learned and assessed through single assessments (van der Vleuten, Heeneman & Schuwirth, 2017).

Conceptualising assessment in this way means that a range of assessments purposefully selected may comprise a program, including those usually considered less standardised or less reliable, because these assessments fulfil a clear purpose in the overall program. Each individual assessment datapoint contributes to the evidence base for determining competence. Progression decisions are not made solely on the basis of one assessment instrument (such as an exam). Instead, accumulated evidence is reviewed by a committee of experts for decision-making purposes when there is enough evidence on the learner to inform robust decisions (van der Vleuten et al., 2015).

In the DIMP program, many of the designed structured learning activities will also generate assessment evidence. This is because a programmatic approach to assessment emphasises the fundamental role of feedback in directing student learning. All assessment datapoints should provide an opportunity for learning. Effective feedback is critical to the success of any programmatic approach (van der Vleuten et al., 2015).

Although programmatic assessment approaches have become highly regarded in health profession education, the philosophy of such approaches contrasts significantly with traditional summative, mastery-based approaches to assessment and learning.

The substantial shift in orientation required to embed a programmatic assessment approach means that implementation is often challenging (van der Vleuten, 2016; Pearce & Prideaux, 2019). For example, the traditional formative/summative dichotomy is replaced with a continuum of stakes, from low- to high-stakes. This requires a shift in thinking for those who may be accustomed to a traditional assessment approach. Each individual assessment datapoint contributes to the evidence base for determining competence. Accumulated evidence is reviewed by expert judges for decision-making purposes.

Programmatic assessment removes pass/fail decisions from single assessment moments. Instead, rich assessment information is gathered on candidates using a wide variety of tools. These data in combination should provide a longitudinal profile on the learner's development (Heeneman et al., 2015).

From a decision-making perspective, gathering rich assessment information across formats provides a clearer picture of candidate performance and enhances the 'trustworthiness and defensibility' of decisions.

High-stakes decisions (such as progression between stages) should be based on review of rich evidence of performance. For this to occur, registrars must ensure that they are regularly uploading evidence to the online platform. High-quality evidence should facilitate a straightforward decision by the committee.

Education and Assessment Framework

Key recommendations in the decision to move towards programmatic assessment include:

Building a culture of promoting high-quality feedback for learning through ongoing training, support, and engagement with all stakeholders

Supporting a process of mentoring registrars through TEAP and allowing personalised remediation for registrars experiencing difficulty

Iteratively enhancing and continuously improving this training handbook and all assessment resources, enabling adaptations based on feedback from stakeholders

A programmatic approach requires support for supervisors to provide high-quality feedback and for registrars to use feedback effectively for learning. The process requires effective communication between the different groups involved to ensure that the system operates as intended and to identify any difficulties in the process (van der Vleuten et al., 2015).

References

Heeneman, S., Oudkerk Pool, A., Schuwirth, L. W., van der Vleuten, C. P., & Driessen, E. W. (2015). The impact of programmatic assessment on student learning: theory versus practice. Medical Education, 49(5), 487-498.

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Pearce, J., & Prideaux, D. (2019). When I say... programmatic assessment in postgraduate medical education. Medical Education, 53(11), 1074-1076.

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Education and Assessment Framework

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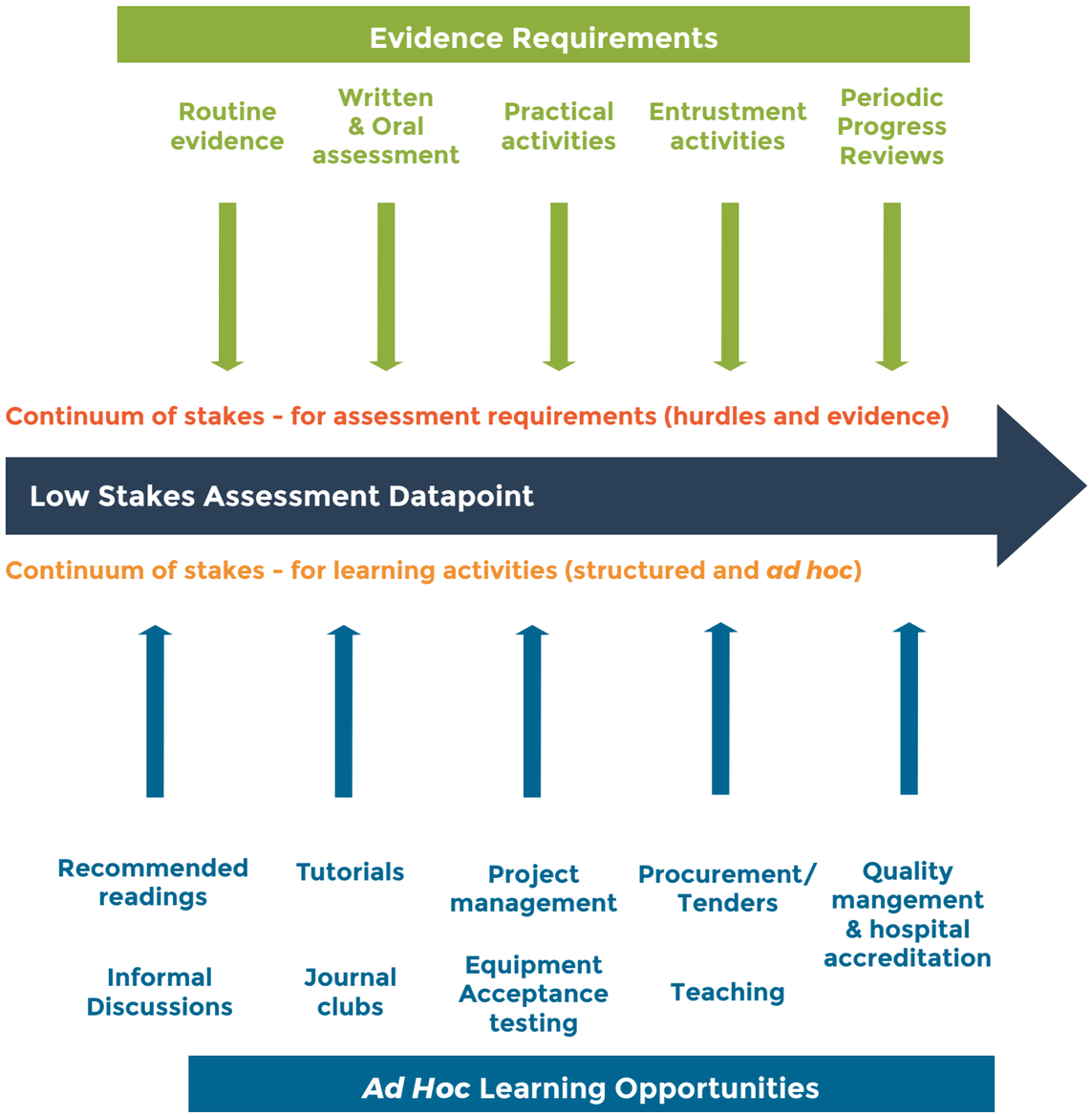
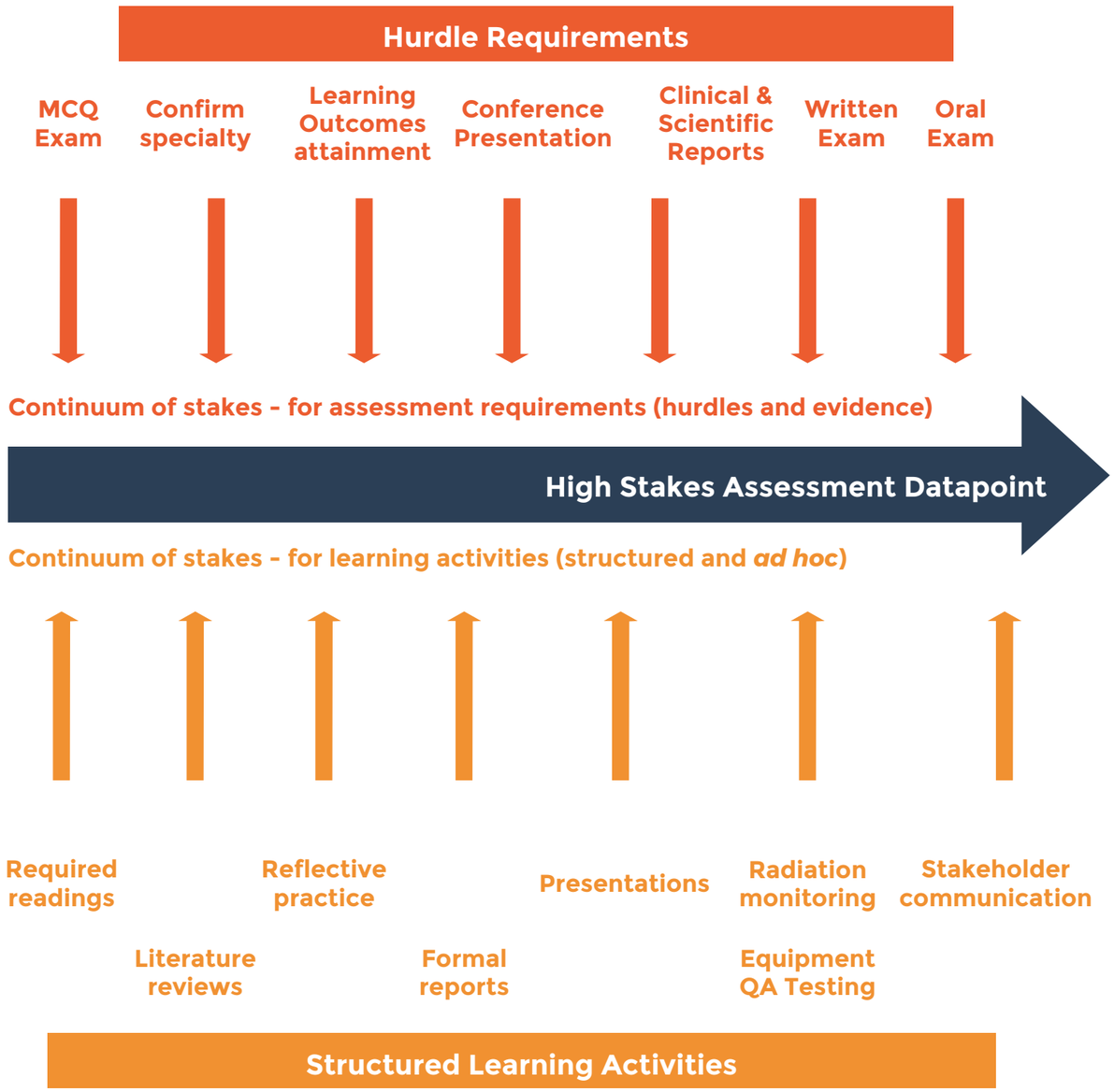
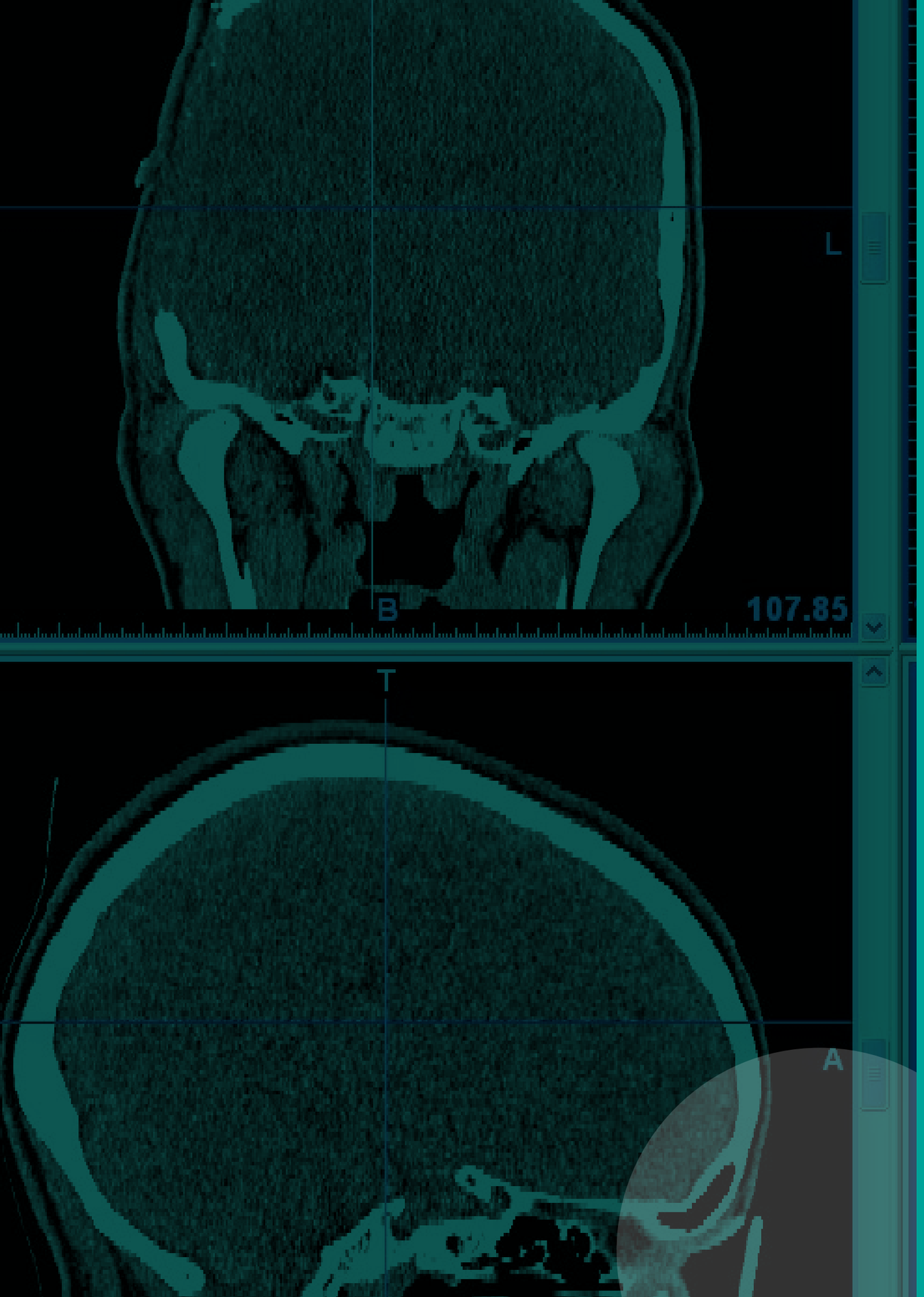
DIMP Programmatic Assessment Evidentiary Framework





In Programmatic Assessment, each individual assessment datapoint contributes to the evidence base for determining competence.

- Evidence can be generated from the following datapoints:
  - Both higher stakes hurdle requirements and lower stakes evidentiary requirements
  - Learning activities, both structured learning activities and ad hoc learning opportunities (of which the above are only examples).
- Accumulated evidence is reviewed by expert committees when making high-stakes decisions (i.e., progression, certification).



STRUCTURED LEARNING ACTIVITIES, ASSESSMENT METHODS AND EVIDENCE REQUIREMENTS

Structured Learning Activities, Assessment Methods and Evidence Requirements

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The DIMP TEAP programmatic assessment model incorporates six categories of assessment evidence:

Routine Evidence, which may be records generated from standard workplace tasks, for example a certificate from a completed internal or external training course, site induction or an approval from a radiation regulator (such as a radiation licence).

Written Task, which may be a specific set of written questions or a task to complete in a certain timeframe. The SLAs available provide guidance on the format and content for specific activities.

Multiple Choice Question (MCQ) Activity, which may be from a textbook or other source (eg. Raphex) or an online set of questions or routine quiz.

Oral Assessment, which may be with a supervisor or assessor, and take the form of a series of structured oral questions with specific prompts and follow-up probing questions. In some LOs the series of questions will take a set format and be supplied to the supervisor. In other LOs, the supervisor has flexibility to determine a set of questions which should be recorded on the assessment form. A record of the topics that were covered and considered at the appropriate level and those that required further development is made.

Practical Activity, which may be a specific practical task that either is, or closely resembles, an authentic task and which is potentially observed and timed, or set by a supervisor or assessor and then the results reviewed.

Entrustment Activity, which may be routine (day-to-day) work that maps to a LO, and the supervisor (or other assessor) uses the Entrustment Scale to rate the registrar's level of entrustment. Repeat ratings should be recorded to show improvement over time.

The form of assessment evidence is distinct from associated structured learning activities. Learning activities are instructions that the registrar can follow to develop their competence in a Learning Outcome, whereas assessment evidence is the method by which attainment of the Learning Outcome will be determined by the expert assessor. It is reasonable to expect a registrar to engage in a number of learning activities that may have routine, practical, written and entrustment components. However, these components are distinct to the form of assessment evidence used to determine attainment of a Learning Outcome.

ENTRUSTMENT RATING SCALE FOR DIMP TEAP

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Constant Direct Supervision	**Frequent Supervision**	**Minimal Supervision**	**Supervision Not Required**
Supervisor/trainer is directly observing registrar's work	Supervisor/trainer is immediately available, and needs to check registrar's work progressively and at completion	Supervisor/trainer is readily contactable, may need to review registrar's work at completion	Supervisor/trainer is available but doesn't need to check registrar's work

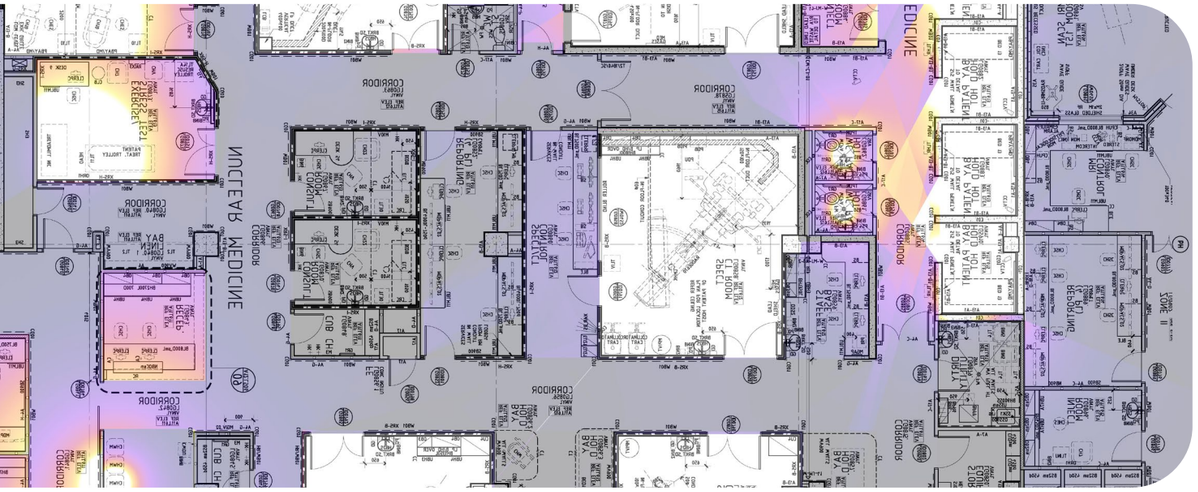
The requirement of gathering evidence should not be onerous and registrars are not expected to generate "evidence for the sake of evidence". Written tasks are designed for learning and not just an assessment tool, and ideally pieces of work should be completed as part of a requirement for clinical work. Registrars should be acquiring learning records, logbook entries and clinical QA data/testing reports to meet evidence requirements. Evidence is not required to be in a formal format. Scans of paper documents or handwritten notes, or screenshots of spreadsheets are acceptable.

There are specific assessment methods assigned to each learning outcome in the Curriculum Framework **(see the Complete mapping of Learning Outcomes to expected assessment evidence section).**

Structured Learning Activities and Assesment Methods

For some learning outcomes there are mandatory structured learning activities. For learning outcomes with non-mandatory activities, high-quality learning activities have been developed and are available to use. However, it is recognised that a training site may have different opportunities to achieve the learning required in a different way. For this reason, for non-mandatory structured learning activities, training sites have the option to vary the activity used to attain the LO and this may include varying the form of assessment evidence to a different form of evidence.

Note that providing assessment evidence for every element of every learning outcome is mandatory.



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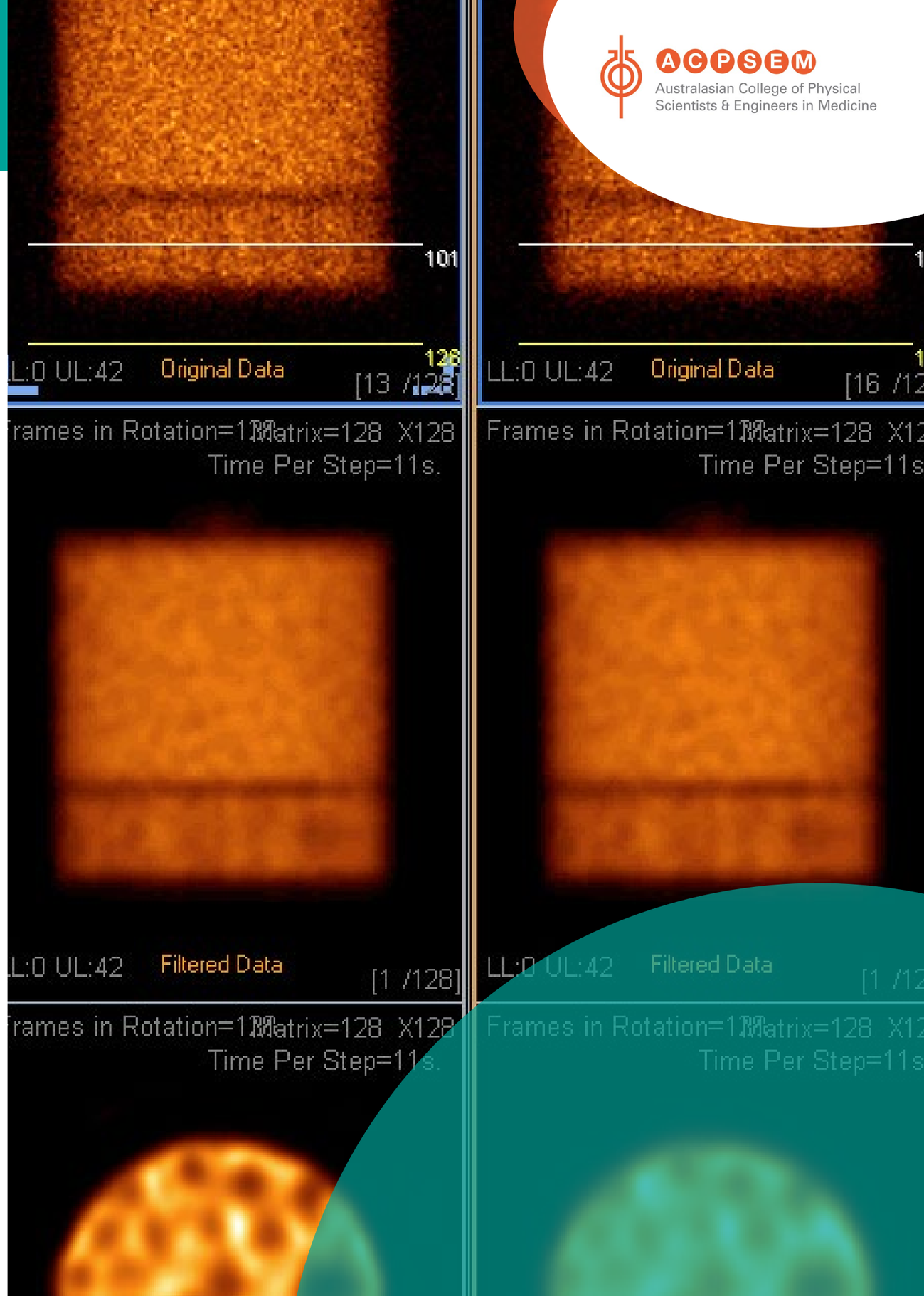
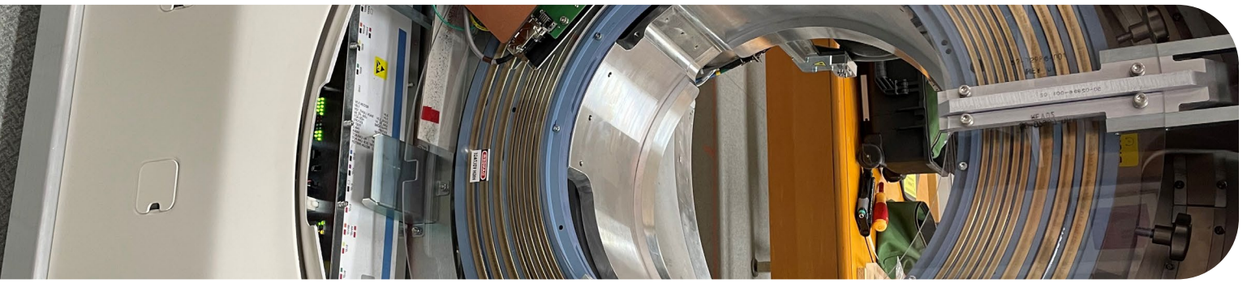


HURDLE REQUIREMENTS

Hurdle Requirements



There are several “hurdles” that must be successfully completed at various points throughout the DIMP TEAP in order to progress to the next stage of training, or to gain final certification. These hurdles form a standardised method of registrar assessment that is conducted by experts outside of the registrar’s training department. Providing a wider assessment environment is in keeping with AMC and international registration body recommendations.

Post-graduate degree (MSc or PhD) in Medical Physics

Some registrars may enter TEAP having already completed a postgraduate degree in Medical Physics. Others may complete this work either at the time of enrolment in TEAP, or concurrently with clinical training, with the DIMP TEAP extended for these registrars to incorporate the additional time required.

Registrars who have completed an MSc or PhD program that is not accredited by the ACPSEM may be exempted from the coursework and/or research components of an ACPSEM accredited MSc program if they can demonstrate equivalency. Assessment of non-accredited programs will generally not be undertaken until the time of TEAP enrolment. At that point, any additional university coursework and/or research requirements will be made a requirement of TEAP completion and the program length will be extended accordingly.

Clinical and Scientific Reports (Stage A, B & C)

Registrars must submit three Clinical and Scientific Reports during their clinical training. Each report is externally assessed and feedback will be provided to the registrar.

For further details, please refer to the DIMP TEAP Clinical and Scientific Report Guidelines.

REPORT	AIM	REPORT TASK
Stage A	Demonstrate critical thinking and high quality scientific and technical writing	Report on a routine medical physics task performed by the registrar describing what was done
Stage B	Demonstrate critical and thorough scientific thinking, high quality scientific writing, reflection upon work performed, independent decision making and competent scientific practice	Report on a routine medical physics task or small project performed independently by the registrar. The task should demonstrate your judgement, decision making and the ability to make recommendations
Stage C	Demonstrate reflection upon the impact of work undertaken in context and ability to lead substantial clinical projects competently and safely	Report on significant clinical project managed by the registrar. Written in the format of a scientific paper

Presentation at a recognised conference

Registrars are required to present a physics-based project that they have had responsibility for at an ACPSEM approved conference. This may be the same project as a clinical and scientific report, or a different project. Conferences must require an accepted abstract submission that has undergone expert peer review as a condition to present and registrars must be listed as the first author in the abstract. Both oral and poster presentations are acceptable, although an oral presentation is preferred as it allows the registrar an opportunity to clearly express themselves in front of their professional colleagues. Presentations must be in one of the diagnostic imaging speciality areas to fulfil the conference presentation requirement.

MCQ Exam

Registrars must sit and pass the MCQ Examination during Stage A of their clinical training. The examination is a closed book, online examination that can be undertaken upon request. It covers KA1-3 and non-speciality specific areas of KA7.

Hurdle Requirements

Written Examination

Registrars must sit and pass the written examination during Stage C of their clinical training. The written examination is a closed book, online examination that covers KA4–10. Note that NM registrars will not be examined on DR specific learning outcomes and DR registrars will not be examined on NM specific learning outcomes.

Oral Examination

The oral examination forms the final hurdle for a registrar to complete TEAP. Registrars can apply to sit the oral examination once they have achieved all Learning Outcomes as well as the conference presentation, post-graduate degree, and other hurdle requirement for stage C. The oral examination will be in 2 parts. In the first part the registrar will present and respond to questioning on Report C. The second part will include questions on clinical scenarios and specialty specific content. Registrars must pass both parts of the exam to successfully complete TEAP.

There are several “hurdles” that must be successfully completed at various points throughout the DIMP TEAP in order to progress to the next stage of training and to gain final certification.

COMPLETE MAPPING OF LEARNING OUTCOMES TO EXPECTED ASSESSMENT EVIDENCE

Complete mapping of Learning Outcomes to expected assessment evidence

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Each Learning Outcome has been mapped to an expected form of assessment evidence.

For each LO, resources have been developed to provide specific learning activities and/or examples of tasks for supervisors to draw on. Some learning activities and their associated specified evidence are mandatory, these are indicated by a * in the table which details the assessment evidence for each LO. All entrustment activities are mandatory.

	Learning Outcome	Assessment Evidence
LO 1.1.1	Understand radioactive decay and decay schemes	MCQ Activity Oral Assessment
LO 1.1.2	Understand how radiation interacts with matter, and apply to the context of diagnostic imaging	
LO 1.1.3	Understand the dependence of exposure on source geometry	
LO 1.2.1	Understand the characteristics of ultrasound and how it interacts with tissues	MCQ Activity Oral Assessment
LO 1.3.1	Understand the basic physics of nuclear magnetic resonance	MCQ Activity Oral Assessment
LO 2.1.1	Identify and describe anatomical, physiological and pathophysiological features in diagnostic imaging and radionuclide therapy	Oral Assessment
LO 2.2.1	Understand and use basic statistical terminology and perform basic statistical analysis for medical applications	Written Task
LO 2.3.1	Understand the basic principles of radiation biology	Oral Assessment
LO 2.4.1	Be familiar with clinical activities commonly used in radiology, nuclear medicine and PET imaging, and radiation oncology	Written Task
LO 3.1.1	Describe key image quality metrics used in diagnostic imaging	MCQ Activity Oral Assessment
LO 3.2.1	Explain how to use common medical imaging information systems	Oral Assessment Practical Activity Written Task
LO 3.2.2	Understand the limits of appropriate use and access to information/data	Routine Evidence
LO 3.3.1	Understand tomographic image reconstruction techniques	Written Task
LO 3.3.2	Perform basic image processing and discuss artefacts specific to digital images	Oral Assessment Practical Activity
LO 4.1.1	Understand radiation protection principles and legislation	Oral Assessment Written Task*
LO 4.1.2	Communicate radiation protection principles	Oral Assessment Practical Activity* Written Task
LO 4.2.1	Identify, quantify, and discuss sources of radiation exposure	Written Task*
LO 4.2.2	Identify, investigate and report on radiation incidents	Written Task* Written Task
LO 4.3.1	Understand local legislative requirements for personal dosimetry	Written Task
LO 4.3.2	Understand the theory, principles of operation and limitations of personal dosimeters	Oral Assessment Written Task
LO 4.3.3	Practice personal dosimetry in a clinical setting	Entrustment Activity* Written Task
LO 4.3.4	Understand and apply the theory, principles of operation and know the limitations of contamination monitors and survey meters	Practical Activity* Written Task
LO 4.4.1	Discuss and perform safe handling of unsealed sources	Entrustment Activity* Routine Evidence Written Task* Written Task
LO 4.4.2	Understand and apply design principles and legislative requirements for areas used for unsealed sources	Oral Assessment Written Task* Written Task

Complete mapping of Learning Outcomes to expected assessment evidence

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LO 4.4.3	Understand and participate in radioactive waste management	Entrustment Activity* Oral Assessment Written Task* Written Task
LO 4.5.1	Understand the principles and requirements of shielding design for diagnostic imaging facilities	Oral Assessment Written Task
LO 4.5.2	Perform verification of radiation shielding	Practical Activity* Practical Activity
LO 4.5.3	Perform radiation shielding design for nuclear medicine and PET facilities	Written Task
LO 4.5.4	Perform radiation shielding design for radiology facilities (DR)	Written Task
LO 4.5.5	Perform radiation shielding design for radionuclide therapy facilities (NM)	Written Task
LO 4.6.1	Understand basic MRI safety	Oral Assessment
LO 4.6.2	Describe in detail factors impacting MRI safety (DR)	Written Task
LO 4.6.3	Understand the basic physics of MRI safety (DR)	Written Task
LO 4.6.4	Understand the basic principles of lasers and associated safety issues	Oral Assessment Written Task
LO 4.6.5	Understand the basic principles of ultrasound safety	Oral Assessment
LO 5.1.1	Understand the main dosimetric quantities relevant to diagnostic imaging	Oral Assessment
LO 5.1.2	Understand measurement devices used in diagnostic imaging	Oral Assessment
LO 5.1.3	Describe and perform measurement of dosimetric quantities in diagnostic radiology (DR)	Written Task

LO 5.1.4	Understand the concepts associated with patient and fetal dose and detriment	Oral Assessment
LO 5.1.5	State typical dose values for common diagnostic imaging applications	Written Task
LO 5.1.6	Calculate organ, effective and fetal dose in CT and be aware of associated limitations and uncertainties	Written Task
LO 5.1.7	Calculate organ, effective and fetal dose in radiography and fluoroscopy and be aware of associated limitations and uncertainties (DR)	Written Task
LO 5.1.8	Calculate peak skin dose in interventional fluoroscopy applications (DR)	Written Task
LO 5.1.9	Calculate organ, effective and fetal dose in nuclear medicine and PET and be aware of associated limitations and uncertainties	Oral Assessment Written Task
LO 5.1.10	Understand and apply the principles of calculation of organ and effective dose using the MIRD methodology (NM)	Written Task
LO 5.2.1	Understand the traceability chain for radionuclide activity measurements	Oral Assessment Written Task
LO 5.3.1	Perform patient specific dosimetry in therapeutic nuclear medicine (NM)	Oral Assessment Written Task
LO 6.1.1	Use patient dose estimates to assess stochastic and tissue reaction risks	Oral Assessment Written Task
LO 6.1.2	Perform risk assessment for research studies/ clinical trials involving exposure of humans to ionising radiation	Entrustment Activity*
LO 6.1.3	Effectively communicate patient radiation risks to a range of stakeholders	Entrustment Activity* Written Task
LO 6.2.1	Assess and effectively communicate radiation exposure risks from patients administered with radiopharmaceuticals to others	Written Task
LO 6.2.2	Assess and effectively communicate occupational radiation exposure risks in diagnostic radiology	Practical Activity* Written Task

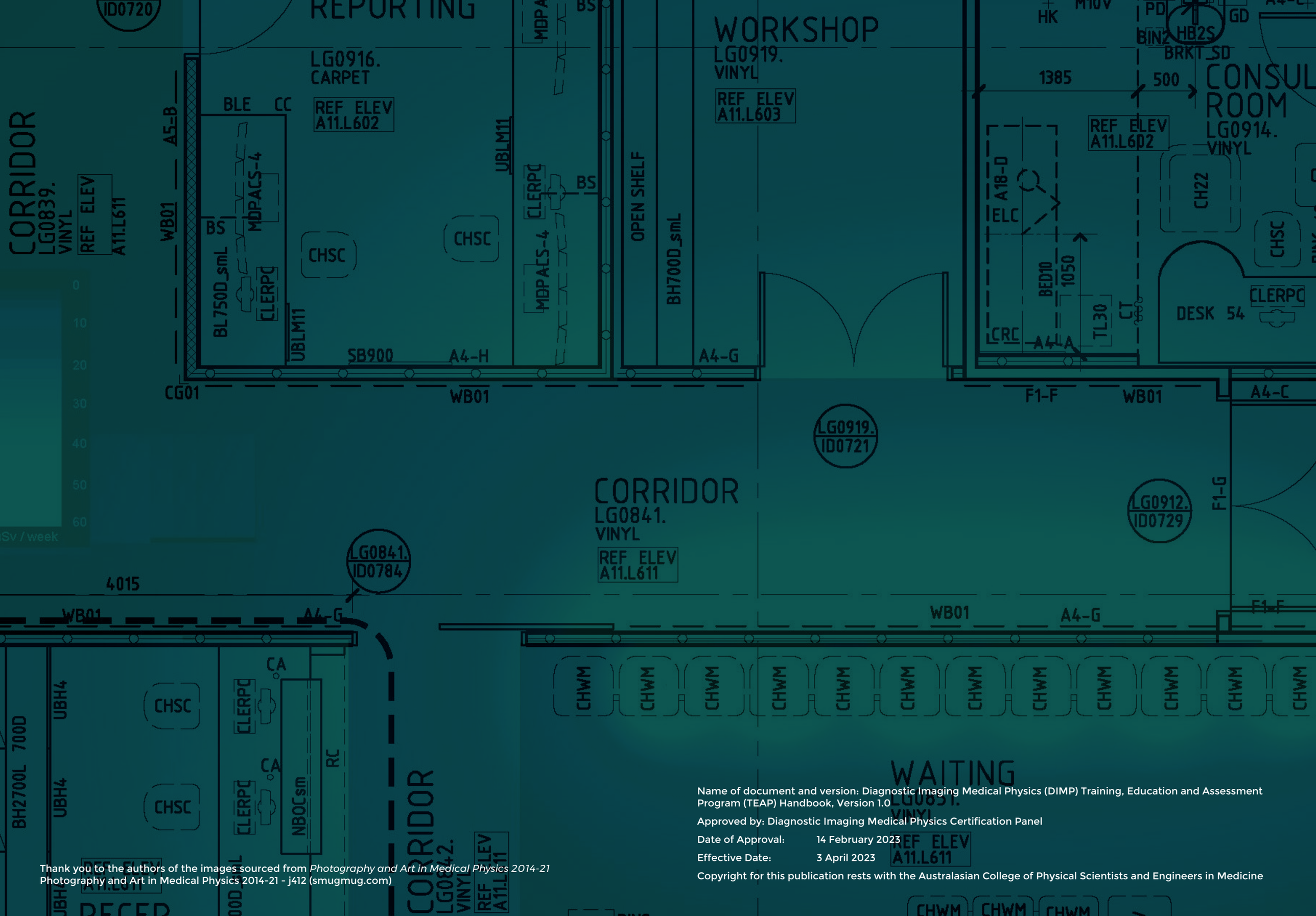
Complete mapping of Learning Outcomes to expected assessment evidence

Australasian College of Physical Scientists & Engineers in Medicine

LO 6.3.1	Assess radiation exposure risks to the fetus and effectively communicate these risks	Written Task
LO 7.1.1	Understand the fundamental design and operating principles of X-ray equipment	MCQ Activity Oral Assessment
LO 7.1.2	Detail the application, design, and operation of X-ray equipment (DR)	Entrustment Activity* Oral Assessment Written Task MCQ Activity
LO 7.1.3	Understand the design and operating principles of diagnostic ultrasound equipment	MCQ Activity Oral Assessment
LO 7.1.4	Understand the design and operating principles of MRI equipment	MCQ Activity Oral Assessment
LO 7.1.5	Understand the design and principles of specialised MRI protocols (DR)	Written Task
LO 7.2.1	Operate and detail the application and design principles of x-ray equipment (DR)	Oral Assessment MCQ Activity
LO 7.2.2	Operate and detail the application and design principles of key nuclear medicine and PET equipment (NM)	Entrustment Activity* Oral Assessment
LO 7.3.1	Describe methods of production of medical radioisotopes	Oral Assessment
LO 7.3.2	Describe desirable characteristics for radionuclides used in nuclear medicine and PET imaging	Oral Assessment
LO 7.4.1	Understand the structure of image file formats commonly utilised in nuclear medicine and PET (NM)	Oral Assessment
LO 7.4.2	Perform basic image manipulation and analysis on a clinical workstation (NM)	Practical Activity
LO 8.1.1	Understand and assess image quality on diagnostic graded medical displays	Practical Activity
LO 8.1.2	Conduct performance testing of radiological equipment and interpret results (DR)	Routine Evidence Entrustment Activity*
LO 8.1.3	Conduct performance testing of nuclear medicine and PET equipment and interpret results (NM)	Entrustment Activity* Oral Assessment Practical Activity* Written Task
LO 8.1.4	Apply a suitable quality control program for diagnostic imaging systems	Written Task
LO 8.2.1	Understand the requirements for acceptance testing	Written Task
LO 8.2.2	Conduct acceptance testing of diagnostic imaging equipment and interpret results	Written Task Practical Activity* Practical Activity
LO 9.1.1	Understand the clinical purpose and techniques used in common diagnostic radiology procedures	Written Task
LO 9.1.2	Understand the clinical purpose and techniques used in common nuclear medicine and PET imaging procedures	Written Task
LO 9.2.1	Explain the commonly performed diagnostic nuclear medicine studies across the following key areas: bone, brain, lung, myocardial, endocrine and renal function (NM)	Written Task
LO 9.2.2	Explain commonly performed diagnostic radiology procedures across the following key examinations: coronary angiography, head CT, CTPA and chest X-ray (DR)	Practical Activity
LO 9.2.3	Understand the physiological basis and protocols for FDG PET studies (NM)	Oral Assessment Written Task
LO 9.2.4	Understand the physiological basis and protocols for common diagnostic PET studies using non-FDG tracers (NM)	Written Task
LO 9.3.1	Explain the main factors affecting quantitative measurements in nuclear medicine (NM)	Written Task
LO 9.3.2	Perform calibrations for quantitative planar and SPECT nuclear medicine studies (NM)	Practical Activity*

Complete mapping of Learning Outcomes to expected assessment evidence

LO 9.4.1	Understand and apply metrics to assess image quality for various diagnostic radiology modalities (DR)	Oral Assessment Practical Activity*
LO 9.4.2	Design and participate in optimisation processes for radiology examinations (DR)	Practical Activity*
LO 9.4.3	Understand and apply optimisation processes for nuclear medicine examinations (NM)	Written Task
LO 9.5.1	Describe national diagnostic imaging accreditation requirements and the role of clinical audit in medical imaging facility accreditation	Written Task*
LO 9.5.2	Perform a dose audit/survey and interpret the results	Written Task Practical Activity*
LO 9.6.1	Discuss the effect on MRI image quality of altering key acquisition parameters (DR)	Oral Assessment
LO 10.1.1	Understand the basic principles and legislation pertaining to radionuclide therapy	Written Task
LO 10.2.1	Understand the principles and aims of ^{131}I thyroid therapies (NM)	Written Task
LO 10.3.1	Discuss common conditions in which non-^{131}I thyroid therapies are used (NM)	Written Task
LO 10.4.1	Effectively communicate appropriate radiation safety precautions for both ^{131}I thyroid and non-^{131}I thyroid therapies (NM)	Entrustment Activity* Practical Activity*
LO 10.4.2	Manage radiation safety and regulatory requirements for both ^{131}I thyroid and non-^{131}I thyroid therapies (NM)	Entrustment Activity* Written Task



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ACPSEM
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