2026

ASMIRT

Guidelines

Cardiac Angiography Course Syllabus Study and Examination Guide

Your profession. Your future.

Australian Society of Medical Imaging and Radiation Therapy
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There are a number of protected titles for medical radiation practice. They include:

Medical Radiation Practitioner (MRP)

Diagnostic Radiographer (DR)

Medical Imaging Technologist (MIT)

Radiographer

Nuclear Medicine Scientist (NMS)

Nuclear Medicine Technologist (NMT)

Radiation Therapist (RT).

For the purposes of our documentation we use the broad descriptor Medical Radiation Practitioner (MRP) recognising that it covers a range of areas of practice.

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Contents

Cardiac Angiography Course Syllabus Study and Examination Guide

Overview

The following key capabilities and enabling components cover the knowledge, skills and attributes needed by all diagnostic radiographers, nuclear medicine technologists and radiation therapists who use Angiography MRPBA Professional capabilities for medical radiation practice (2020) Domain 1: Key Capabilities 3 & 8 and Domain 1A: Diagnostic Radiographer, Key Capability 2.

Key capabilities – *What registered medical radiation practitioners must be able to do*	**Enabling components** – *Evidence of this capability for general registration as a medical radiation practitioner*
1. **Understand and apply the different methods of imaging and treatment.**	a. Understand the different imaging and treatment pathways in medical radiation practice. b. Understand the modalities and equipment used in the different imaging and treatment pathways across medical radiation practice. c. Understand use of CT, MRI and PET in the localisation of a range of cancer sites, patient/client presentations and related planning procedures. d. Operate equipment and apply knowledge of laboratory procedures to practice when necessary. **Modalities and equipment** may include but are not limited to x-ray equipment, computed radiography, digital radiography, mammography, dental panoramic radiograph, fluoroscopy, angiography, computed tomography, magnetic resonance imaging, ultrasound, positron emission tomography, single photon emission computed tomography, dose calibrator, bone mineral densitometry, sample counters, superficial x-ray, linear accelerator, brachytherapy, ion chambers, planning systems, hybrid imaging systems, radiochemistry synthesis units or radiation therapy treatment delivery systems.

Key capabilities – *What registered medical radiation practitioners must be able to do*	**Enabling components** – *Evidence of this capability for general registration as a medical radiation practitioner*
8. **Apply knowledge of safe and effective use of medicines.**	a. Apply the principles of safe and effective use of medicines to practice. b. Recognise the risks, precautions and contraindications of the use of medicines, informed by the patient's/client's current pathology status. c. Apply knowledge of pharmacokinetics, pharmacodynamics and the potential range of reactions to medicines. d. Safely and effectively deliver medicine to patients/clients, in accordance with procedures. e. Actively monitor the effects of medication and manage adverse reactions to medicines, in accordance with protocols.

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Key capabilities – *What registered medical radiation practitioners must be able to do*	Enabling components – *Evidence of this capability for general registration as a medical radiation practitioner*
	Knowledge of safe and effective use of medicines relevant to practice may include state and territory and/or federal legislation about the supply and administration of medicines. It also includes understanding how pathological conditions may affect the delivery of some medicines. **Procedures for safe and effective delivery of medicines** must be consistent with the NSQHS's Medication Safety Standard and may include checking products, confirming correct labelling, accurate calculations and measurements and correct route.

1. **Perform fluoroscopy and angiography examinations in a range of settings.**	a. Operate fluoroscopy and angiography systems safety and effectively in a range of settings. b. Effectively communicate with the multidisciplinary team as the imaging request, patient history and previous medical images are reviewed, the patient is assessed to receive care and the procedure is planned. c. Prepare the patient/client for the examination, including positioning the patient/client for the best diagnostic outcome. d. Apply knowledge of equipment geometry for procedures. e. Apply knowledge of imaging acquisition modes and radiation dose rates. f. Perform image post-processing techniques. g. Prepare the patient/client and delivery systems with the appropriate contrast media using aseptic techniques. h. Apply knowledge of medical equipment and prostheses used in the angiography and operating theatre setting. i. Collaborate in the design and evaluation of fluoroscopy and angiography protocols. **Range of settings** may include but are not limited to an imaging department, emergency department, operating theatre, intensive care unit, an angiography suite with both fixed and mobile equipment. **Knowledge of equipment geometry for the procedure** may include but is not limited to beam-receptor angulation, source-image distance, rotational imaging, anti-scatter equipment (physical and digital) and radiation protective shielding. **Knowledge of radiation dose delivery** may include but is not limited to radiation dose factors, image frame rate for fluoroscopy and

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	image acquisition, x-ray beam collimation and filtration, geometric and digital magnification and fluoroscopic road-mapping. **Delivery systems** may include but are not limited to intra-arterial, intravenous, oral, and hepatobiliary. **Medical equipment used in angiography** may include but is not limited to catheters, guide wires, stents, vascular occlusion devices, vascular clips and filters, and prostheses.

Justification

ASMIRT is providing this certification as recognition that a medical radiation practitioner (MRP) is performing with professional skill in cardiac angiography. This certification provides practitioners and employers with direction for study and educational programs, a benchmark of industry-standard skill, and formal recognition of the ability of the MRP.

Cardiac Angiography Level 1 Certification of medical radiation practitioners by ASMIRT implies MRPs have the knowledge to:

- Operate proficiently in an angiographic clinical environment and during complex procedures
- Assess patient suitability for and oversee safe administration of contrast media
- Evaluate appropriate angiographic protocols for scanning purposes
- Individualise scanning technique to suit patient procedure
- Evaluate normal anatomy, and unexpected or urgent medical findings
- Understand ongoing quality assurance and safety implications

Introduction

The Cardiac Angiography Level 1 Certification process is aimed at radiographers who have a minimum of minimum of one-year full time equivalent experience, with ideally three-five years full time experience in a broad range of angiography examinations. In order to pass the theoretical component, candidates are expected to undertake revision of textbooks and other relevant literature prior to sitting the exam.

The Cardiac Angiography Level 1 certification encompasses theoretical and clinical components. In order for a candidate to apply for a 'Cardiac Angiography Level 1 Certificate', the candidate must meet all of the following requirements:

1. Achieve a pass grade of 75% with no element below 65% for the Cardiac Angiography Level 1 Certification Examination (Part A)
2. Perform the required clinical component as outlined below (Part B)

Cardiac Angiography Level 1 Certification Examination

The formal examination will involve a paper not exceeding 170 multiple-choice questions covering a range of topics (refer to the following study guide for details). The examination is divided into 6 sections. The table below indicates the number of questions related to each topic.

Section A	Angiographic equipment	20
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Examination Preparation

Angiography Experience - this exam is not designed for candidates who have spent less than 3-5 years in an angiography suite. You are not precluded from sitting the examination, but past results have shown that it is extremely difficult to pass without significant hands-on angiography experience.

Study period - A pass in this examination is dependent on a well-designed and lengthy study program. Successful candidates have recommended a minimum of 6 months concentrated study.

Mentors- successful candidates have involved their work colleagues, previous successful candidates and a mentor. It is also recommended to use study material that contains multiple choice questions or review questions. There is no requirement to answer the section in any particular order, e.g. some candidates suggested answering the section that you are most familiar with first.

LEARNING OBJECTIVES

Section A: Angiographic Equipment

TOPICS:

General

- Understand the French sizing system

Sheaths

- Understand vascular sheaths
    - General design and purpose
    - Use of long Sheaths
    - Purpose of Break-Away (peel apart) sheaths

Catheters

- Understand the terms
    - Pushability
    - Crossability
    - Torque
    - Steerability

- Compare and contrast the shape, characteristics and use of the following flush catheters
    - Pigtail
    - Contra/VCF/ Omni Flush

- Understand the general (visual) shape of the following catheters
    - JR4
    - AL1
    - JL4
    - IM

- Understand the common uses of the following catheters (principle anatomical engagements)
    - TIG
    - JR4
    - AL1
    - IM
- Understand the design and primary uses of Glide Catheters

- Understand the following characteristics of Guide Catheters
    - Sizing
    - Indications for use
    - How they differ from a standard diagnostic catheter

- Understand the general definition of a micro-catheter and describe its applications and major benefits

Guide Wires

- J-Wires vs. straight wires
    - Indications for use
    - Advantages and disadvantages

- Understand the design and general use of Glide Wires

- Compare and contrast the following wire-based delivery systems
    - 0.035 vs 0.014
    - Understand the primary uses (and limits) of each system in coronary angiography/angioplasty

- Know the primary uses, general length, and disadvantages associated with the use of Exchange Wires
    - Standard exchange
    - Stiff exchange

- Amplatz

Balloons

- Understand the term balloon compliance
    - Compare the uses of compliant vs. non-compliant balloons

- Understand the following angiography balloon terms
    - Rated Burst Pressure
    - Nominal Pressure

- Difference between circumferential and longitudinal balloon rupture

- Specialist balloons
    - Cutting balloons - Describe the design and indications of cutting balloon use
    - Drug Eluting Balloons – describe their uses and the drugs routinely applied

Stents

- Compare and contrast Self Expanding and Balloon Expandable Stents
    - Delivery mechanisms
    - Advantages vs. disadvantages (including radial strength characteristics)

- Understand the design and general uses of Covered Stents

- Indications and differences between drug eluting and bare metal coronary stents

- Understand what is meant by 'in-stent restenosis'
    - Causes
    - Treatment

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Section B: Angiographic Anatomy, Pathophysiology & Pharmacology

TOPICS:

- Identify the macroscopic and microscopic structure of arteries and veins
- Understand the principles of Virchow's triad
- List pathological processes that may result in arterial narrowing
    - Intrinsic vs. extrinsic
- Acute
- Chronic
- List pathological process that result in vascular occlusion
    - Acute
    - Chronic
- Understand the pathological process behind aneurysm development
    - Fusiform vs. saccular vs. mycotic
    - True vs. false (pseudo) aneurysm
- Understand the following terms
    - Arterio-venous malformation
    - Arterio-venous fistula

Arterial Anatomy - Principles

- Describe the composition of the femoral triangle
- Understand the structure of an artery (Intima, Media, Adventitia)
- Understand what is meant by left vs. right coronary artery dominance
- List the arterial supply to the heart indicating which portion of the heart is supplied by each vessel
- Understand the chambers and valves of the heart
    - Functional and anatomical (structural) differences between each chamber
    - Valve locations and anatomical (structural) differences
- List the arterial pathway for a coronary arteriogram using
    - A right radial access approach
    - A right femoral access approach
- List the arteries (and veins) commonly used for Coronary Artery Bypass Grafting
    - Understand the difference between venous and arterial grafts

- List the arteries of the aortic arch (the great vessels)
    - Understand the positions (proximal/distal) relative to the arch

- List the names of the structure of the ascending aorta
    - Aortic sinuses
    - Coronary artery origins
    - Structural anatomical junctions

Bloodwork

Clotting Factors

- Understand the clinical relevance of a low haemoglobin level, and its primary causes
- Understand an International Normalised Ratio (INR) test and when it should be performed
- Discuss the functions of platelets during vessel haemostasis.
    - Understand the implications of a low platelet count

- Understand an Activated Clotting Time (ACT) test and when it should be performed

Renal Function

- Understand the clinical importance of Glomerular Filtration Rate (GFR) tests in angiography, and know the levels for safe operation

- Understand Creatinine: What it is, how it is produced, and how to manage high levels prior to angiography

- Understand Urea: What it is, how it is excreted, and the clinical relevance of low levels

Troponin

- Understand Troponin testing: Why it is done, safe levels, and what it reveals clinically

Drugs

- Lignocaine
    - Drug class
    - Common dosing
    - Effect of combining with Epinephrine
- Fentanyl
    - Drug class
    - Primary Uses
    - Common dosing
- Midazolam
    - Drug class
    - Primary Uses
    - Common dosing

- GTN
    - Discuss the primary angiographic use
    - Mechanism of action

- Heparin
    - Drug class
    - Primary angiographic uses
    - Common dosing

- Indications for use during angiography:
    - Adrenaline
    - Atropine

Section C: Angiographic Physics

Radiation Biology & Safety

- Understand what contributes to patient dose in fluoroscopic procedures
    - Types of photons (transmitted, scattered and absorbed)
    - Common methods for reducing these doses

- Understand what contributes to operator dose in fluoroscopic procedures
    - Areas of highest scatter dose
    - Types of photons (transmitted, scattered and absorbed)
    - Common methods for reducing these doses

- Discuss the importance and uses of Diagnostic Reference Levels (DRL) in angiography
    - Understand how DRL values are arrived at

- Compare and contrast acute and chronic radiation injury
    - Define each type
    - Common forms these injuries may take
    - Trigger levels

- Radiation Dose Metrics

- Describe the location and purpose of the Interventional Reference Point (IRP)
    - Understand the implications of changing table height on the resultant radiation dose measurements

- Understand Dose Area Product (DAP)
    - What it is
    - Where it is measured
    - Clinical relevance

- Discuss Air Kerma (AK)
    - What is it
    - Clinical relevance, and how it differs from the Surface Entrance Dose
    - Understand how to determine the maximum skin dose (single region) where multiple projections have been used

Radiation Protection

- Know the Australian Standards for
    - Heavy lead gowns
    - Annual absorbed dose limits

Imaging Physics

- Understand the effects of a changing field of view (FOV) on patient dose
    - Collimation vs. magnification

- List image magnification changes with changes to the following
    - Source-to-image distance
    - Source-to-object distance
    - Object-to-image distance

- Know the common focal spot sizes in use in angiography, and understand
    - The effect on image resolution
    - The effect on heat loading

- Understand the effects of changing matrix size on image resolution

- Understand what the Detective Quantum Efficiency (DQE) says about an angiography system.
    - What is its relevance?

- Vessel calibration methods
    - Understand the limitations of each method (foreshortening, magnification, errors induced when calibrating from small distances)
- Measuring catheters

- Catheter/sheath width calibration

- Automatic (magnification factor) calibration

- Ruler calibration (top of table, or on top of patient)

Bi-Plane Angiography

- List advantages of bi-planar angiographic systems
- List disadvantages of bi-planar angiographic systems
- Understand the uses of bi-planar imaging during cardiac imaging

Digital Subtraction Techniques

- Understand the creation of DSA images
    - Understand why DSA is not routinely used in coronary angiography
    - Understand the use of mask images

Contrast Injection Principles

- Understand Poiseuille's Law
    - Factors affecting the pressure of injection
    - Maximising injection flow rates
- Understand the use of angiographic powered injectors and what each parameter controls
    - Injection rate
    - Injection volume
    - Injection delay
    - X-ray delay
    - Pressure limit
- Understand injection related 'catheter recoil' and how this can be minimised

Section D: Fundamental cardiac angiographic principles

General Principles

- Understand why patients must remain still during procedures and the methods used to achieve this
- Understand why monitoring a patient's blood pressure, oxygen saturation, and respiratory rate during a procedure is important
- Understand the risks of pressure injury and for the patient and ways to prevent this

Sterile Technique

- Understand basic principles of sterile technique as they relate to the procedure, staff, patient and xray equipment
- Why and how sterile gowns/gloves/drapes are used
- How to dispense sterile equipment equipment/fluids into the sterile field
- Cleaning preparation of the access site

- Use of personal protective equipment in the procedure room

Vascular Access

- List all steps (in order) of the 'modified' Seldinger technique
    - Indicate equipment required at each stage

- Compare and contrast radial vs. common femoral arterial access
    - Indications
    - Contraindications
    - Post-operative benefits

- Know what the Allen's Test is and how it is performed

- List potential complications related to arterial access

- Understand vessel closure methods
    - Radial access
    - Femoral access

- Manual Pressure

- Fem-Stop process

- Vascular closure devices

Patient Care, Procedural Risks & Complications

- Understand the risks and complications of coronary angiography
    - Procedural
    - Post-procedural

- List major and minor complications related to the injection of iodinated contrast media

- Understand the concepts of post procedural patient care

    - Haematoma risk
    - Radial vs Femoral approach
    - Differences between diagnostic coronary angiography and PCI procedures

- Understand the key concepts of patient preparation for coronary angiography
    - Fasting
    - Warfarin
    - Access Site Preparation

ECG Interpretation

- Understand why the ECG is monitored in the Cardiac cath lab
- On an ECG rhythm strip, be able to recognise the P, Q, R, S and T waves
- Understand what each wave on the ECG represents physiologically
- Know what is meant by an arrhythmia
- On an ECG rhythm strip, be able to recognise:
    - Ventricular Fibrillation (and know what to do)
    - Ventricular Tachycardia (understand the difference to ventricular fibrillation)
- On an ECG rhythm strip, be able to recognise:
    - Ventricular Standstill (and understand its importance)
    - ST elevation
- Know the basic functions of an automatic external cardiac defibrillator
- Understand what is meant by bradycardia and tachycardia
- Understand the SA and AV nodes
    - Where they are located
    - What are their functions
- Have a basic knowledge of the electrical conduction through the heart

Section E: Fundamental cardiac angiographic procedures – Part 1: Coronary/Arterial procedures

Angiographic Procedures: Cardiac Angiography

- Understand why monitoring a patients intra-arterial blood pressure is important for cardiac procedures
    - How is this achieved
- List indications and contra-indications for performing diagnostic cardiac angiography
- List projections required to demonstrate the left main coronary artery
- List projections required to demonstrate the left anterior descending artery
- List projections required to demonstrate the circumflex artery
- List projections required to demonstrate the right coronary artery

- Describe left ventriculography
    - Indications
    - Projection
    - Catheter used

- Understand the use of the pullback gradient after entering the left ventricle
    - Understand the normal gradient value
    - What does a high gradient value clinically mean

- For arch aortography list
    - Indications
    - Standard projection
    - Catheter used
    - The normal diameter of the ascending aorta

Angiographic Procedures: Coronary Angioplasty (PCI)

- Understand what Percutaneous Coronary Intervention is and when it is performed
    - Understand the Chronic Total Occlusion (CTO) variation of the PCI procedure

- Understand the different lesion classifications (Types A, B, C)
    - Understand how the lesion classification may affect PCI treatment

- Understand the different stages of the PCI procedure

- Understand the use of guide catheters during PCI
    - Reasons for use
    - Understand why some guide catheters have side holes, and when they should be used

- Understand the principle radiographic elements of proper lesion assessment
    - The importance of using orthogonal views
    - The implications of image foreshortening in lesion sizing

- Understand why Heparin and GTN are used during PCI procedures

- List the basic complications of PCI
    - Procedural
    - Post-procedural
    - Radiation dose implications for patients and staff during extended PCI procedures

- Understand Acute Coronary Syndrome (ACS)
    - Symptomology
    - Understand the difference in patient presentations for ACS vs a stable, elective PCI procedure
    - Understand why ACS procedures must be performed in a timely manner
    -

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- Understand what is meant by ST Elevation Myocardial Infarction (STEMI)
    - Understand the difference between STEMI and NSTEMI presentations

- Understand the TIMI Flow Score and its clinical procedural relevance

- Understand Fractional Flow Reserve (FFR)
    - How it works
    - What the results clinically/physiologically represent
    - Why it may be used prior to PCI
    - The function and use of adenosine during testing

Angiographic Procedures: Right Heart Procedures

- Understand the primary indications for a right heart procedure

- Understand the normal ranges for the blood pressure in each of the right heart chambers

- Be able to recognize where a Swan Ganz catheter is purely from its visual pressure trace characteristics
    - Understand the pressure trace characteristics of the following four regions

- RA

- RV

- PA

- PWP

- Describe the construction of a Swan Ganz catheter and its use
    - Why does it have a balloon at its tip
    - Functions of the thermister

- Understand cardiac output testing
    - What is meant by Cardiac Output (what are the variables)
    - How is it measured during a right heart procedure?
    - What is the relationship between the rate of blood flow and the change in temperature?

- Understand the use of thermo-dilution during cardiac output studies
    - Why are multiple readings taken?

- Understand what is meant by pulmonary wedge pressure
    - How can it be used to assess mitral valve gradients?
    - How can it be used in the assessment of acute pulmonary oedema?

- Understand how structural heart defects may be diagnosed during a right heart procedure
    - Left-to-right heart shunts
    - Paediatric/congenital deformities

- Understand how pulmonary valve gradients may be measured and their clinical relevance

Section E: Fundamental cardiac angiographic procedures – PART 2: Electrical and structural procedures

Angiographic Procedures: Pacemaker Procedures

- List the main indications for:
    - A permanent pacemaker (PPM)
    - An Automatic Internal Cardiac Defibrillator (AICD)

- Understand the functions of a pacemaker
    - Understand the differences between a PPM and an AICD
    - Understand the difference between single lead and dual lead pacing systems
    - Understand the difference between temporary and permanent pacing systems

- Understand pacemaker lead design and function
    - Understand the differences between sensing, pacing and shocking
    - Understand the differences between a passive pacing lead and an active fixation lead

- Understand loop recorder devices (Linq)
    - Where are they implanted
    - Why are they implanted
    - How do they differ from a PPM?

- Understand bi-ventricular devices
    - How they differ from a standard pacing system
    - Describe the route taken by the left ventricular lead
    - Understand how a bi-ventricular device may assist cardiac function

- List the standard/common locations for a pacemaker generator

- List the main complications of inserting permanent pacemakers
    - Which plain x-ray is of most value post procedure
    - Understand the importance of sterility during permanent pacing procedures

- Understand the differences in radiographic quality requirements between pacemaker, bi-ventricular pacing and coronary angiography procedures
    - Magnification
    - Exposure parameters

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- Understand the radiation exposure differences between
    - A loop recorder insertion
    - An easy single lead PPM insertion
    - A complicated three lead bi-ventricular AICD insertion

Angiographic Procedures: Electrophysiology (EP) Procedures

- List the main indications for an EP study

- Understand the following EP studies:
    - A diagnostic EP procedure
    - A Pulmonary Vein Isolation (PVI) procedure

- Understand Cryo-ablation and Radio-Frequency Ablation (RFA) therapies
    - The differences between the two
    - Understand how these methods are used to treat abnormal electrical pathways in the heart

- List the standard access routes for EP catheters

- Understand trans-septal punctures
    - When and why is it used during some EP procedures
    - Understand its risks
    - Describe the technique

- Understand the design and function of EP catheters
    - Describe where the CS catheter would sit during an EP study

- Understand the uses of the following drugs during an EP study
    - Flecainide
    - Isuprel (Isoprenaline)

- Understand the purpose of using an additional 3D mapping system (Carto, Navix, Pruker) during EP cases
    - Indications for use
    - Procedural benefits
    - Implications for radiation dose

- Understand the differences in radiographic quality requirements between EP studies and coronary angiography procedures

Angiographic Procedures: Structural Heart Procedures

- Understand Atrial Septal Defects (ASD)
    - Indications for closure
    - List what size ASD would be referred for surgery
    - What type of device is used to close an ASD?
    - Know how an ASD can be measured angiographically

- Understand Patent Foramen Ovale (PFO) procedures
    - Understand the anatomical relationships
    - Indications for closure
    - Difference between an ASD and a PFO

- Understand Patent Ductus Arteriosus (PDA) closure procedures
    - Understand the anatomy and pathophysiology of a PDA
    - Understand the circumstances under which a PDA would be closed
    - Understand the access routes for a PDA closure

- Understand Aortic Valvuloplasty procedures
    - Indications
    - Understand why rapid ventricular pacing is required for aortic valvuloplasty
    - List the major complications of aortic valvuloplasty

- Understand Trans-Aortic Valve Implantation (TAVI) procedures
    - Indications
    - Understand why accurate profiling of the aortic sinuses is important in TAVI procedures
    - Why is accurate sizing of a TAVI device so important
    - What peripheral vascular presentations will prevent the use of a TAVI procedure

- Understand why a left atrial appendage (LAA) would require closure
    - Know the different ways in which a left atrial appendage orifice can be measured

- List the 3 main shapes of the left atrial appendage
    - List is the best fluoroscopic projections to profile the LAA orifice

Section F: Angiographic/Fluoroscopic Image Labelling

List and/or Label the Following Anatomical Structures:

Thoraco-Abdominal

- Aortic arch and great vessels

- Abdominal aorta
    - Coeliac artery
    - Superior mesenteric artery
    - Renal arteries
    - Lumbar arteries

- Pelvic Arteries
    - Common iliac
    - Internal iliac
    - External Iliac

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Coronary Arterial Anatomy

- Left main coronary artery

- Left anterior descending artery
    - Diagonals
    - Septals
    - Anterior interventricular (mid and distal left anterior descending artery)

- Left Circumflex artery
    - Atrial branch
    - Obtuse marginal

- Ramus Intermediate

- Right Coronary Artery
    - Conus branch
    - Right ventricular branch
    - Right acute marginal branch
    - Posterior descending artery (in right coronary dominant system)
    - Postero-lateral left ventricular branch (in right coronary dominant system)

Peripheral

- Upper arm arterial supply
    - Subclavian artery and branches
    - Axillary artery
    - Brachial artery
    - Radial, ulnar and interosseous arteries

- Label the anatomy of the lower limb arteries
    - Common femoral arterial bifurcation
    - Superficial and Deep (profunda) femoral

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Reading Material

These texts are considered by ASMIRT to provide the applicant with a sound understanding necessary to complete the theoretical component and assist with additional knowledge for the clinical aspects of Level 1.

Basics of Angiography

Interventional Radiology: A survival Guide, 3rd Edition, Kessel and Robertson

2012 Handbook of radiologic procedures, 4th edition, Kandarpa and Machan, 2012

Anatomy

Atlas of Vascular anatomy: an angiographic approach, 2nd edition, Uflacker, 2007

Cardiac angiography

Grossman's Cardiac catherization, angiography and intervention, Donald S. Baim, 7th Edition, 2006 through the following link:

https://books.google.com.au/books?id=r0cES10SKMC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Cardiac angiography projections

Coronary angiography in the angioplasty era: projections with a meaning. Carlo Di Mario, Nilesh Sutaria Heart 2005;91:968–976. doi: 10.1136/hrt.2005.063107

Other Materials

Any other source material can suffice however the information must be general in its applications to angiography. Doctor, practice and site-specific methods may be too narrow in their applications and should be avoided. Site specific practices are not being examined, only the fundamental angiography methodologies (which apply across all sites).

Please refer to the Policies & Procedures Manual for up-to-date information on Cardiac Angiography Level 1 Certification (Part A). This document can be found at: https://www.asmirt.org/certification/

Sample Examination Questions:

1. Why does using radial arterial access for a coronary angiogram lead to higher patient radiation doses?

   a.) More acquisitions of the contrary arteries are required
   b.) Radial artery catheters are smaller, therefore acquisitions are longer
   c.) The anatomy from the radial artery to the aorta is often more tortuous requiring more fluoroscopy to visualise
   d.) Initial cannulation of the radial artery can take considerably longer time than femoral access

   The correct answer is (c)

2. The pressure limit on a power injector exists:
   a.) To increase the duration of a procedure
   b.) To protect the patient, catheter and injector from extreme pressure increases
   c.) To prevent the use of extremely low pressures
   d.) To stabilize the injection pressure

   The correct answer is (b)

3. A positive D-Dimer test indicates:

   a.) Probable myocardial infarction
   b.) No myocardial infarction
   c.) No PE or DVT
   d.) Probable PE or DVT

   The correct answer is (d)

4. List the ideal projection for demonstrating the left common femoral bifurcation.

   a.) LAO 10
   b.) LAO 30
   c.) RAO 30
   d.) RAO 10
   e.)

   The correct answer is (b)

5. The severity of an atrial septal defect can be determined by:

    a.) Taking a series of oxygen saturations from different areas of the right heart
    b.) Taking a series of oxygen saturation from different areas of the left heart
    c.) Performing a right ventriculogram
    d.) Performing a left ventriculogram

    The correct answer is (a)

6. Which projection is normally used to traverse a catheter through the chambers of the right heart to the pulmonary arteries:

    a.) Left anterior Oblique
    b.) Right anterior oblique
    c.) Posterior anterior projection
    d.) Lateral projection

    The correct answer is (c)

7. How would a catheter be able to travel directly from the right atrium to the left atrium?

    a.) Through a patent Foramen ovale
    b.) Through a trans septal puncture
    c.) Through an Atrial Septal Defect
    d.) All the answers are correct

    The correct answer is (d)

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The Cardiac Angiography Level 1 Certification Examination Structure

The examination involves a series of 170 directed questions which will be accessed from an online examination platform and displayed on a local computer system.

It will be conducted over a duration of 3 hours (180 minutes).

1. The examination will be performed on a specific local I.T. / computer screen system.
2. Each examination question in each section will follow the same consistent approach for evaluating the correct answer using a multiple-choice answering system.
3. The candidate will access the on-line examination using a unique username and password (provided by ASMIRT). Once the candidate has entered the portal, the Cardiac angiography examination will be available on the dashboard for selection.
4. Once the candidate has selected the Cardiac angiography examination and are ready to commence the examination, they are permitted to do so.
    - The candidate has three (3) hours to complete the examination. A timer commences count down on the screen to show elapsed time.
    - After three (3) hours has elapsed, the candidate will no longer have access to the examination.

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Pre – Cardiac Angiography Level 1 Examination Platform Access (For Both Supervisor and Candidate)

1. Once the candidate has registered for the examination, the candidate will be required to nominate a supervisor to supervise this examination. The candidate will need to negotiate with the supervisor an appropriate date and time to undertake this examination. A supervisor declaration form will need to be completed and submitted to ASMIRT for approval.

2. Once the supervisor has been approved, they will be given access (via a unique username and password) to the examination portal to undertake a "Test" Cardiac Angiography familiarisation test.

   - URL link
   - Username: xxx
   - Password: xxx

3. This will ensure that the supervisor will be able to test the local computer that will be used for the examination to check any workplace 'firewall" issues, suitability of the room/location including noise and light, functionality of the examination platform, and the examination process.

4. Concurrently, the candidate will be provided with their unique username and password, to enable the candidate to undertake a "practice" examination of anywhere between 2 to 4 questions to ensure there is an understanding of the functionality of the system.

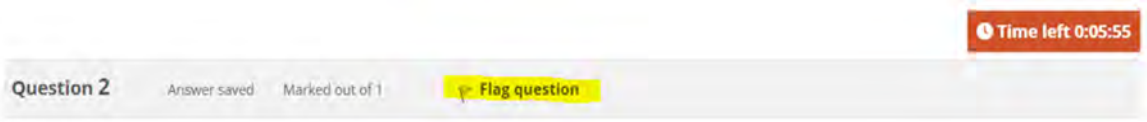
5. ASMIRT recommends that the above checks by the supervisor and the examination preview by the candidate should be undertaken a week before the actual examination.

6. The candidate will be required to click on top right-hand side of the page and insert their unique username and password, then click on the green arrow to log in.

7. The candidate will then be presented with the examination. When the candidate is ready to begin, click on green button **ATTEMPT QUIZ NOW**.

8. Upon viewing, the candidate will be presented with a directed question and be presented with several alternative answers and be required to choose the correct answer under a multiple-choice format.

9. If the candidate is unsure about a question and would like to return to it later, they can "flag" the question by click on the flag.

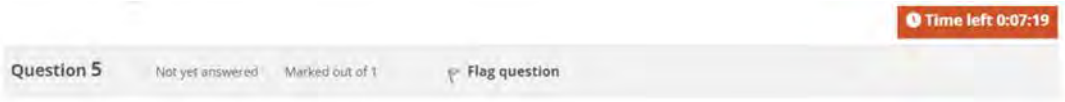


10. This will also appear on the candidate's Quiz Navigation section (located in the top right-hand corner of each question) as a red flag to highlight the question that they would like to return to.

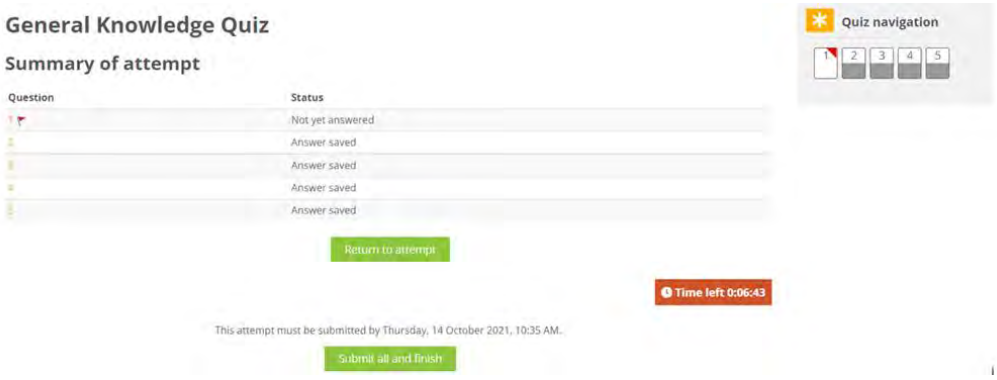
11. The candidate should also note that once the question has been completed, that question will be highlighted in "grey" on the "Quiz Navigation" section on the right-hand side of the examination (See image above). The Quiz Navigation will indicate how many questions have been completed and the sections the questions are located in.

12. Unanswered questions will be shown as blank. Those that are flagged and unanswered have a red flag and are blank.

13. Please take note of the timer. Once the exam commences, this will continue until you have completed the exam.



14. Once all of the exam questions have been completed, the summary of the attempt will be displayed.



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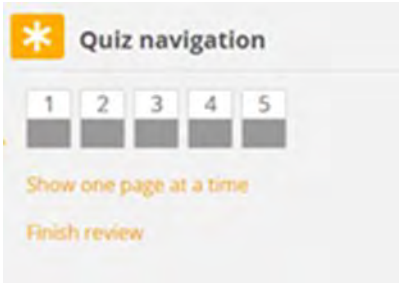
15. You will have an opportunity to go back to any flagged questions to change / provide an answer if there is time left.

16. Click on **RETURN TO ATTEMPT** and select the question you wish to return to.

17. Once you have completed all the questions, the Quiz Navigation boxes will all have a grey section.



18. By unticking the flag, it will remove the flag from the question and the quiz navigation. To save confusion, remember to uncheck the flag once you have answered the question.

19. Once the candidate has submitted all answers, the questions and selected responses will appear. Complete the process by scrolling to the bottom of the page and click on **FINISH REVIEW**.

20. Once the candidate is satisfied that all answers have been completed, click on **SUBMIT ALL AND FINISH**.

21. The candidate will be provided a confirmation text box. Upon completion of the examination, click on **SUBMIT ALL AND FINISH**. Make sure that this green button has been clicked prior to the time expiring, to ensure that your answers are recorded, and the exam completed.

22. Candidates will only have **ONE** attempt to sit this examination.

The candidate will have a twenty (20) minute time limit on the Pre – Cardiac Angiography familiarisation test. ASMIRT recommends that candidates use as much of that time to ensure complete familiarity with all possible combinations of the examination, as well as the "Red Flag" system, and the "Quiz Navigation" system.

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Cardiac Angiography Level 1 Certification Examination Summary

1) The candidate will be given access (via a unique username and password) to the Cardiac Angiography Level 1 Certification Examination once registration processes and supervisors have been verified.

2) The candidate will negotiate an agreed date and time with their supervisor to sit the examination. At this agreed date and time, the examination can commence. To ensure that there is appropriate examination support from the ASMIRT certification team, Candidates sitting this examination in both Australia and countries outside of Australia will need to ensure that the examination time is conducted within an Australian time zone of 8am – 8pm.

3) It is the assumption of the examination markers that the "Test" Pre – Cardiac angiography familiarisation test has been attempted to ensure that the candidate understands both the requirements of the examination and the examination functionality.

4) The examination's time duration is 180 minutes to answer 170 questions. After the allotted 180 minutes, the examination will automatically be closed.

5) If the candidate finishes the examination before the allotted time expires, the **SUBMIT ALL AND FINISH** button must be selected. This ensures that all answers are recorded.

6) This examination will be conducted over a designated period of one week. This allows for both flexibility and ease for both the candidate and supervisor. Examination marking will commence once the examination period has concluded.

7) All ASMIRT examinations are three hours in length. Candidates may be sitting in an examination room with other candidates sitting other examinations with the same supervisor. They may be leaving at different times depending on how quickly they complete their examination. Candidates may leave early but please be respectful of other candidates (if applicable).

8) Candidates are not to screen capture, take photos or write questions down during the examination.

9) Examination results will be emailed to candidates within a fortnight of the examination week concluding.

10) In the instance that there are unforeseen circumstances with the technology, the supervisor will contact the ASMIRT certification team to promptly report the problem, and a new date and time will be negotiated with the candidate to re sit the examination.

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