National Competency Framework for Registered Nurses in Adult Critical Care

Cardiac

Speciality Competencies

Working Version- February 2021

Learner Name:	**Signature:**

Lead Assessor/ Mentor Name:	**Signature:**

Foreword

Competence is defined throughout this document as:

"The combination of skills, knowledge and attitudes, values and technical abilities that underpin safe and effective critical care nursing and interventions" (CC3N 2016: 9).

These competencies are designed to be used in Cardiac Critical Care in conjunction with the National Competency Framework for Adult Critical Care Nurses (CC3N, 2015). The Cardiac Competencies can be completed in conjunction with the Step One, Two and Three of the National Competency Framework according to unit requirements. Similarly, to Step 1 there may be elements that must be completed within the supernumerary period, these will be identified locally and recorded during your initial interview.

These competencies have been designed to provide you with the core skills required to care for critically ill patients with cardiac care needs. It is recognised that developing competency in practice depends on a number of factors including a range of experiences and opportunities, however we acknowledge the variance between units and practices so please identify, record and complete sections relevant to your unit and patient group. You may also wish to indicate sections which are not relevant to your clinical area, for a record of completeness.

Contents

Learning Contract

The following Learning Contract applies to the Individual Learner, Lead Assessor and Unit Manager and should be completed before embarking on this competency development programme. It will provide the foundations for:

- Individual commitment to learning
- Commitment to continuing supervision and support
- Provision of time and opportunities to learn

LEARNER RESPONSIBILITIES

As a Learner, I intend to:

- Take responsibility for my own development
- Successfully complete a period of induction/preceptorship as locally agreed
- Form a productive working relationship with mentors and assessors
- Listen to colleagues, mentors and assessor's advice and utilise coaching opportunities
- Complete the elements shaded and italicised as priority and within the supernumerary period
- Use constructive criticism positively to inform my learning
- Meet with my Lead Assessor at least 3 monthly
- Adopt a number of learning strategies to assist in my development
- Put myself forward for learning opportunities as they arise
- Complete these competencies in the recommended 12-month time frame
- Use this competency development programme to inform my annual appraisal and development needs
- Report lack of supervision or support directly to unit manager at the first opportunity

Learner Name (Print) ……..
Signature……
Date……

LEAD ASSESSOR RESPONSIBILITIES

As a Lead Assessor, I intend to:

- Meet the standards of regulatory bodies (NMC 2008)
- Demonstrate ongoing professional development/competence within critical care
- Promote a positive learning environment
- Support the learner to expand their knowledge and understanding
- Highlight learning opportunities
- Set realistic and achievable action plans
- Complete assessments within the recommended time frame
- Bring to the attention of the HEI, Education Lead and/or Manager concerns related to individual nurses learning and development
- Plan a series of learning experiences that will meet the individual's defined learning needs
- Prioritise work to accommodate support of learners within their practice roles
- Provide feedback about the effectiveness of learning and assessment in practice

Lead assessor Name (Print) ……...
Signature…… Date……

CRITICAL CARE LEAD NURSE/MANAGER

As a critical care service provider, I intend to:

- Facilitate a minimum of 40% of learners' clinical practice hours with their mentor/assessor and/or Practice Educator or delegated appropriate other
- Provide and/or support clinical placements to facilitate the learner's development and achievement of the core/essential competency requirements
- Regulate and quality assurance systems for mentorship and standardisation of assessment to ensure validity and transferability of the nurses' competence

Lead Nurse/ Manager Name (Print) ……
Signature……Date……

Authorised Signature Records

Print Name	Sample Signature	Designation	PIN No:	Organisation

Specialist Cardiac: Tracker Sheet

The following table allows the tracking of these specialist cardiac competencies and should be completed by Lead Assessors/Mentors and/or Practice Educators (or equivalent) as the individual achieves each competency statement. This provides an easy and clear system to review and/or audit progress at a glance.

Competency Statement	Date Achieved	Mentor/Assessors Signature
C1. Cardiac anatomy & physiology		
C2 Cardiac common conditions and related pathophysiology		
C3 Adult congenital Heart Disease		
C4 Cardiac surgical procedures		
C5 Pre-operative assessment		
C6 Cardiopulmonary Bypass (CPB)		
C7 Immediate post-operative care (6 hours)		
C8 Longer term care of post-operative management		
C9 Chest drains		
C10 Cardiac output monitoring & measurement		
C10.1 CO monitoring devices		
C10.2 Pulmonary artery flotation catheter: preparation, insertion, care & removal		
C11 Pacing		
C12 Cardiac mechanical support: Intra-aortic balloon pump (IABP)		
C13 Cardiac Mechanical support		
C13.1 ECMO		
C13.2 Ventricular Assist Devices (short term)		
C13.3 Ventricular Assist Devices (long term)		
C13 .4 Impella		
C14 Transplant		
C15 Pharmacology application in the cardiac population		
C16 Cardiac arrest following cardiac surgery		
C17 Interventional cardiology		
CT18 12 lead ECG Interpretation		

The following competency statements are about Cardiac Critical Care. It is intended that the competencies in this section will build on knowledge and skills you are gaining in Steps 1, 2 & 3

C1 Cardiac Anatomy & Physiology

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date
Macro structure ● size and position ● layers of the heart ● cardiac chambers and valves ● systemic and pulmonary circulation ● coronary circulation Micro structure ● cardiac versus skeletal muscle ● myocardial fibres Electrophysiology of the heart ● action cell potential ● automaticity Determinants of blood pressure ● BP = CO X SVR Determinants of normal cardiac cycle ● CO = HR (autonomic control) X SV (preload, afterload and contractility) ● ejection fraction ● starlings Law Regulation of heart rate ● catecholamines ● aortic and Bainbridge reflexes	

C2 Cardiac Common Conditions and Related Pathophysiology

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

• Coronary Artery Disease
  ○ atherosclerosis
  ○ atheroma formation
• Valves
  ○ stenosis
  ○ regurgitation
• Aortic Dissection
• Aortic Aneurysm
• Marfans
• Cardiomyopathy
• Endocarditis
• Myocarditis
• Pericardial disease
• Congestive heart failure
• Carcinoid syndrome	

C3 Adult Congenital Heart Disease (ACHD)

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

• The altered anatomy and physiology of the following conditions:
  ○ atrial septal defect (ASD)
  ○ ventricular septal defect (VSD)
  ○ atrioventricular septal defect (AVSD)
  ○ transposition of the great arteries (TGA)
  ○ hypoplastic Left Heart
  ○ fontans Circulation
  ○ dextrocardia
• Surgical procedure for the above	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

• Provide postoperative management specific to the ACHD population in relation to:
  ○ fluid management
  ○ mechanical ventilation
  ○ target haemoglobin
  ○ target saturation
• Provide emotional reassurance and support
• Liaise with specialist ACHD services	

C4 -Cardiac Surgical Procedures

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

• Surgical procedures and common reasons for intervention:
  ○ Valve repair / replacement
  ■ aortic
  ■ pulmonary,
  ■ mitral
  ■ tricuspid
  ○ Coronary Artery Bypass Grafts (CABG)
  ■ saphenous vein graft (SVG)
  ■ internal mammary artery (IMA)
  ■ radial artery
  ○ Aortic Dissection Repair
  ○ Aortic root
  ○ Pulmonary Embolectomy
  ○ Insertion of Mechanical Support Devices (see section C12)
  ○ Left Atrial Appendage Occlusion (LAAO)
  ○ Heart/Lung transplantation	

C5 Pre-operative Assessment

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date
● Assessing fitness for surgery ○ dental checks ○ cognitive function ○ exercise tolerance tests ○ CXR ○ pulmonary function tests ○ echocardiogram ○ electrocardiogram (ECG) ○ MRI ○ CT scanning ○ angiography ○ scoring systems (local) ○ pharmacology ○ haematology/ biochemistry/ thyroid function test	

C6 Cardiopulmonary Bypass (CPB)

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date
● Physiological function of CPB ● Indications and contraindications for use ● Components of the CPB circuit and their functions: ○ reservoir ○ blood Pump ○ oxygenator / heat exchanger ○ left ventricular vent ● Cannulation sites ● Priming Fluid and anticoagulation ● Sites for placement of aortic and venous cannula ● Cardioplegic solutions ● Weaning from CPB ● Physiological effects of CPB	

C7 Immediate post-operative care (6 hours)

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

● Initial observations and arterial blood gases (ABGs)
● Biochemistry & haematology
● Haemodynamics
● Temperature management
● Fluid management
● Dysrhythmias
● Mediastinal & pleural drain management
● Haemorrhage and control of bleeding
● Tamponade
● Renal assessment and dysfunction
● Neurological assessment and dysfunction
  ○ monitor cognitive function
  ○ manage CSF drains post aneurysm repair
● Nurse led 'fast track' weaning protocol
● Pharmacology
 	
Management of a patient with an Open Chest / Non- Sternal Closure
● Reasons for delayed sternal closure
● Effect of delayed sternal closure on:
  ○ ventilation/sedation/ neuromuscular blockades
  ○ temperature regulation
  ○ resuscitation
  ○ infection
  ○ tissue viability
  ○ mobility
  ○ long term recovery
● Wound management	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

● Receive handover of patient from theatre and confirm surgery specific parameters
● Record and respond appropriately to nursing observations
● Adjust fluid management in relation to patients' physiological condition
  ○ crystalloid
  ○ colloid
  ○ blood products
● Administer medication within prescribed limits:
  ○ electrolytes
  ○ analgesia
  ○ sedation
  ○ antiarrhythmics
  ○ inotropes
  ○ vasodilators
  ○ vasopressors	

Cont'd

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date
○ inodilators ○ insulin ○ antiplatelets ○ anticoagulants ● 'Double pump' vasoactive drugs as per local policy ● Manage mediastinal drains and respond appropriately to abnormal levels of bleeding (refer to CT 9) ● Perform thromboelastography (TEG) testing and administer clotting products and antifibrinolytics as indicated ● Assess and respond to post-operative pain as per local policy ● Wean and extubate patient as per local policy ● Monitor CSF drainage post aneurysm repair ● Remove CSF drain as per local policy ○ Position patient - open chest	

C8 Longer term care of post-operative management

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date
For the purpose of these competencies this relates to ongoing care issues and complications that may arise from hour 6 onwards: ● Late onset dysrhythmias ● Electrolyte disturbances ● Fluid balance/shifts and rationale for appropriate fluid replacement: ○ crystalloid ○ colloid ○ blood products ● Bleeding ● Impaired cognitive status ● Surgical wounds ○ pain ○ infection ● Respiratory complications: ○ pleural effusion ○ haemo/pneumothorax ● Mechanical valves and long-term anticoagulation ● Long term conditions and preoperative medications	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

• Manage pacing system (refer to CT11)
• Adjust fluid management in relation to patients' physiological condition
• Administer medication within prescribed limits:
  ○ electrolytes
  ○ analgesia
  ○ sedation
  ○ antiarrhythmics
  ○ inotropes
  ○ vasodilators
  ○ vasopressors
  ○ inodilators
  ○ insulin
  ○ antiplatelets
  ○ anticoagulants
• Monitor cognitive status and assess for postoperative delirium
• Assess pain and differentiate between cardiac and surgical origins
• Manage postoperative pain:
  ○ external sternal wound support devices
  ○ pain busters
  ○ sternal nerve blocks
• Review prescribed medications with the MDT in relation to:
  ○ recommencing preoperative drugs as appropriate
  ○ long term anticoagulation
  ○ Manage negative pressure wound care systems	

C9 Chest Drains

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

• Anatomy and physiology relating to chest drain insertion:
  ○ pleural drains
  ○ mediastinal drains
  ○ pericardial drains
• Indications for use of each type of chest drain
• Care and management of a patient with a chest drain:
  ○ safety equipment
  ○ low pressure suction
  ○ chest drainage
  ○ methods for clearing/unblocking chest drains
  ○ use of clamps
  ○ indications for removal of chest drains
• Complications of chest drain removal and appropriate management
• Knowledge of:
  ○ single chamber systems
  ○ multi chamber systems
  ○ digital chest drain systems	

Cont'd

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

• Assemble chest drain systems
  ○ Single chamber systems
  ○ multi chamber systems
  ○ digital chest drain systems
• Manage mediastinal drains and respond appropriately to abnormal levels of bleeding (Refer to CT9
• Remove chest drains as per local policy:
  ○ pleural drains
  ○ mediastinal drains
  ○ pericardial drains
• Complete post removal observations
• Management of complications relating to drain removal:
  ○ pneumothorax	

C 10.1 Cardiac Output monitoring & measurement

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

• Techniques and devices for measurement of cardiac output:
  ○ Fick principle
  ○ thermodilution and chemodilution (PAFC/LIDCO)
  ○ pulse contour analysis (PiCCO)
  ○ doppler ultrasound (oesophageal doppler)
  ○ impedance cardiography (chest impedance)
• Indications and contraindications for use of the above techniques and devices
• Interpretation of cardiac output measurements
• Rationale for appropriate choice of treatment	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date
• Set up device as per local policy • Perform cardiac output measurements • Administer appropriate fluid and medication within prescribed limits • Remove device as per local policy	

C.10.2 Pulmonary Artery Flotation Catheter: Preparation, Insertion, Care & Removal

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

● Indications/ contraindications for use
● Risk benefit analysis and clinical trials
● Role and responsibilities during the insertion of the introducer and PAFC
● Preparation of the patient for insertion of PAFC
  ○ blood profile
  ○ equipment
  ○ injectate fluid
  ○ patient position
● Waveforms interpretation & monitoring
● Function and internal position of PAFC lumens and ports
● Definition and normal limits for:
  ○ Cardiac output (CO)
  ○ Cardiac index (CI)
  ○ Stroke volume (SV)
  ○ Pulmonary artery pressure (PAP)
  ○ Pulmonary artery wedge pressure (PAWP)
  ○ Systemic vascular resistance (SVR)
  ○ Systemic vascular resistance index (SVRI)
  ○ Mixed venous oxygen saturation (Sv02)
● Potential complications of having a PAFC insitu
● Removal of PAFC
  ○ observations,
  ○ X-ray
  ○ blood profile
  ○ technique	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor/Date
● Perform PAFC safety checks ● Record PAWP and respond appropriately to findings ● Obtain a full set of cardiac output measurements and titrate medication within prescribed limits ● Safely remove PAFC	

C 11 Temporary Pacing

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor/Date

● Physiological functions of pacing
● Types of temporary pacing:
  ○ epicardial,
  ○ transvenous
  ○ transdermal/external pacing
● Indications, contraindications for use of the above types of pacing
● Components of pacing system
● Fixed (asynchronous) versus demand (synchronous) pacing
● Modes of pacing/universal pacemaker codes:
  ○ AAI
  ○ VVI
  ○ DVI
  ○ DDD
● Assessment of
  ○ underlying rhythm
  ○ stimulation/ output threshold
  ○ sensitivity threshold
● Rhythm interpretation
● Complications
  ○ lead failure
  ○ loss of capture
  ○ failure to sense
  ○ lead displacement
  ○ R on T phenomenon
● Removal procedure and complications
  ○ tamponade
  ○ problematic wire removal
  ○ air embolism	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor/Date

● Complete safety checks
● Record and respond to nursing and pacing observations
● Check/change the following as per local policy:
  ○ underlying rhythm
  ○ pacing threshold
  ○ sensitivity
  ○ battery
  ○ ECG
● Remove pacing wires
● Complete post removal observations
● Position transcutaneous pacing pads and activate external pacing mode on defibrillator	

C12 Cardiac Mechanical support Intra-Aortic Balloon Pump (IABP)

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

• Physiological functions of the IABP
• Risk benefit analysis and clinical trials
• Indications and contraindications for use
• Components of the IABP:
  ○ catheter
  ○ console
  ○ gas cylinder
• Console settings:
  ○ trigger
  augmentation
  ○ ratio
  ○ alarms
• Position of catheter
• Waveform interpretation
• Complications and prevention / management:
  ○ ischaemia and compartment syndrome
  ○ bleeding
  ○ atelectasis
  ○ thrombus formation
  ○ infection
  ○ occlusion / migration of catheter
  ○ balloon rupture
  ○ gas leak
• Haematological tests and anticoagulation protocol
• Management of cardiac arrest
• Weaning and removal of catheter	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

• Complete IABP safety checks:
  ○ catheter
  ○ calibration
  ○ fast flushing as per local policy
• Record and respond appropriately to nursing and IABP observations
• Assess lower and upper limb perfusion
• Position patient to minimise pressure damage and prevent occlusion/migration of catheter
• Administer anticoagulation as per local policy
• Provide emotional reassurance and support
• Complete post removal observations	

C13.1 Cardiac Mechanical support - ECMO

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

● Definition of ECMO
● The difference between:
  ○ Veno-Venous (VV- ECMO),
  ○ Veno-Arterial (VA-ECMO)
● Indications and contraindications for use of each type of ECMO
● Role of the perfusionist
● Components of the ECMO Circuit:
  ○ blood Pump
  ○ air/oxygen blender
  ○ heater unit
  ○ flow probe
  ○ oxygenator
  ○ inflow and outflow cannula
● Console settings and symbols:
  ○ power source
  ○ menu
  ○ pump speed
  ○ flow
  ○ alarms
● Emergency equipment as per local policy
● Nursing observations:
  ○ vital signs and waveform recognition
  ○ temperature
  ○ flow rate
  ○ line pressures
  ○ ventilator and monitoring SaO_2 and SvO_2
  ○ haematological tests and anticoagulation protocols
  ○ inspection of the oxygenator
  ○ inspection of cannulation sites
● Complications and management:
  ○ decrease in flow rates
  ○ hypoxia / hypercarbia
  ○ decrease SaO_2/SvO_2
  ○ bleeding
  ○ pump failure
  ○ pump head disengagement
  ○ thrombosis
  ○ cardiac arrest
  ○ accidental decannulation
  ○ infection
● Weaning ECMO	

Cont'd

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

• Complete safety checks
• Record nursing observations
• Respond appropriately to:
  ○ drop in flow rate
  ○ chattering lines
  ○ kinked lines
  ○ decrease in SaO_2 / SvO_2
• Perform emergency procedures:
  ○ transfer pump/ motor to the backup console
  ○ de-airing of circuit
  ○ pump failure
  ○ cutting in a new circuit (maintaining underwater seal connection
• Position patient to minimise risk of pressure damage and accidental decannulation of lines
• Administer anticoagulation as per local policy
• Provide emotional reassurance and support
• Complete post removal observations
• Safe disposal of the ECMO circuit	

C13.2 Cardiac Mechanical support – Ventricular Assist Devices (VAD) (Short term devices)

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

• Definition and purpose of short term VAD
  ○ inspection of cannulation sites
• Complications:
  ○ decrease in flow rates
  ○ RV flow higher than LV flow
  ○ chattering lines
  ○ kinked lines
  ○ haemolysis
  ○ console/ monitor failure
  ○ accidental decannulation
  ○ infection
Discontinuation of therapy
 	
• Definition and purpose of short term VAD
• The differences between:
  ○ Left ventricular assist devices (LVAD)
  ○ Right ventricular assist devices (RVAD)
  ○ Biventricular assist devices (BIVAD)	

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

● Indications and contraindications for use of each type of VAD
● Position for each type of VAD
● Components of the VAD circuit:
  ○ console
  ○ motor drive
  ○ pump head
  ○ inflow and outflow cannula
● Console settings and symbols:
  ○ power source
  ○ mains icon
  ○ battery icon
  ○ flow rate
  ○ flow rate alarms
  ○ STOP button
● Emergency equipment as per local policy
● Nursing observations:
  ○ flow rate
  ○ arterial and doppler blood pressure monitoring
  ○ inspection of cannulation sites
● Complications:
  ○ decrease in flow rates
  ○ RV flow higher than LV flow
  ○ chattering lines
  ○ kinked lines
  ○ haemolysis
  ○ console/ monitor failure
  ○ accidental decannulation
  ○ infection
● Discontinuation of therapy	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

● Complete safety checks
● Record nursing observations
● Respond appropriately to:
  ○ drop in flow rates
  ○ chattering lines
  ○ kinked lines
● Perform emergency procedures:
  ○ defibrillation
  ○ no flow
  ○ console motor failure
  ○ dislodgement of cannula
● Position patient to minimise risk of pressure damage and accidental removal of cannula
● Administer anticoagulation as per local policy
● Provide emotional reassurance and support
● Complete post removal observations	

C13.3 Cardiac Mechanical support – Ventricular Assist Devices (VAD) (Long term devices)

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date
● Anatomy and physiology in relation to implanted LVAD ● Indications and contraindications for use ● Position of pump and cannula ● Components of the VAD circuit: ○ inflow and outflow cannula ○ pump ○ system controller ○ power mode and leads ○ batteries and clips ○ backup system controller ● Controller settings and symbols as per local device ● Emergency equipment as per local policy ● Nursing observations: ○ flow rate ○ inspection of cannulation sites ● Complications: ○ altered flow rates ○ console failure ○ alarm states ○ infection ● Patient education	
You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date
● Complete safety checks ● Record nursing observations ● Respond appropriately to: ○ change in flow ○ device alarms ● Perform emergency procedures: ○ defibrillation ○ no flow ○ console motor failure ○ dislodgement of cannula ● Administer anticoagulation as per local policy	

C13.4 Cardiac Mechanical support - Impella

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

• Physiological function of the Impella
• Indications and contraindications for use
• Components of the Impella device and their functions:
  ○ catheter
  ○ catheter plug
  ○ controller
  ○ purge cassette
  ○ purge fluid
• Impella observations:
  ○ flow rate
  ○ P level
  ○ motor current
  ○ purge pressure and flow
  ○ placement signal
• Nursing observations:
  ○ vital signs
  ○ assessment of circulation / ischaemia
  ○ assessment of cannulation site
  ○ haematological tests and anticoagulation protocol
• Complications and management:
  ○ right ventricular impairment or failure
  ○ dysrhythmias
  ○ incorrect placement of device
  ○ battery failure
  ○ console failure
• Removal of catheter	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

• Complete safety checks
• Record and respond appropriately to nursing and Impella observations
• Respond appropriately to:
  ○ purge alarms
  ○ changes in placement signal
  ○ cardiac arrest
  ○ battery failure
  ○ controller failure
• Position patient to minimise risk of pressure damage and accidental removal of Impella device
• Prime and change purge cassette
• Administer anticoagulation as per local policy
• Provide emotional reassurance and support
• Complete post removal observations	

C14 Transplant

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

● Criteria and contraindications for heart and/or lung transplantation
● Additional pre-assessment investigations specific to transplantation
  ○ blood profile
  ○ donor-recipient matching
● Significance of recent blood transfusion
● Surgical procedure and altered physiology
  ○ denervated heart
  ○ loss of cough reflex
● Post -operative management
  ○ fluid management
● Nitric oxide therapy
● Immunosuppressant therapy
  ○ perioperative regime
  ○ maintenance regime
  ○ administration of anti-thymocyte globulin (ATG)
  ○ oral versus intravenous drug dosage
● Monitor for rejection
● Monitor for graft dysfunction
● Post-operative complications:
  ○ rejection
  ○ graft dysfunction/failure
  ○ infection
  ○ side effects of immunosuppression
  ○ allograft vasculopathy
  ○ post-transplant lymphoproliferative disorder	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date
● Record and respond appropriately to nursing observations ● Administer immunosuppressant medication within prescribed limits ● Complete nitric oxide safety checks/ observations ● Monitor methaemoglobin levels when receiving nitric oxide	

C15 Pharmacology Application in the Cardiac Population

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date
● Define ○ inotropes, ○ vasodilators, ○ inodilators ○ vasopressors ○ chronotropes ○ ace inhibitors ○ beta- blockers ○ calcium channel blockers ● Understand therapeutic ranges mls versus mcgs/kg and receptor site activity ● Awareness of site of action, indication and contraindication for use: ○ adrenaline ○ noradrenaline ○ dopamine ○ dobutamine ○ dopexamine ○ vasopressin ○ terlipressin ○ milrinone ○ enoximone ○ isoprenaline ○ phenylephrine ○ glyceryl Trinitrate ○ sodium Nitroprusside ○ levosimendan ○ metaraminol ● Indications and contraindication: ○ electrolyte supplement ○ factor 8 ○ protamine ○ tranexamic acid ○ heparin ○ Inhaled nitric oxide therapy ○ sildenafil ○ antiplatelet Agents ○ epoprostenol ● Indications for fluid choice: ○ crystalloid colloid debate ○ blood products ● Pain management variations in cardiothoracic management, for example: ○ pain busters ○ pectoralis major blocks	

Cont'd

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date
● Administer medications using syringe driver/volumetric pump as per unit policy ● Assess effectiveness of medications and titrate doses within the remit of prescription and predetermined ranges.	

C16 Cardiac Arrest following cardiac surgery

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date
● Resuscitation Council Guidelines (specific reference to ALS & CALS algorithms) ● Aetiology and epidemiology relating to cardiac arrest in the post cardiac surgery patient ● Knowledge of surgery, cardiac devices and application to the open chest scenario ● Rationale for 'stacked' shocks ● Practice and procedure for emergency resternotomy	
You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

● Adjust pacing box in cardiac arrest
● Identify and treat peri-arrest arrhythmias
● As per local guidelines demonstrate specific alteration in the ALS algorithm for a cardiac patient (CALS)
  ○ setting of the CALS trolley and equipment
  ○ roles in the arrest situation
  ○ pharmacology
  ○ chest opening and awareness of cardiac surgery, and devices in situ
  ○ defibrillation
  ■ stacked shocks
  ■ Internal
  ○ internal compressions
● Participate in effective debrief	

C17 Interventional Cardiology

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date

• Knowledge of the following procedures and associated complications:
  ○ primary/rescue percutaneous coronary intervention (PCI)
  ○ bare metal/drug eluting stents
  ○ bioresorbable vascular scaffolds
  ○ retrograde CTO (incl gaia wire)
  ○ adjunctive pharmaceutical therapies
• Cardiac resynchronisation therapy devices (CRTDs)
  ○ CRT-P
  ○ CRT-D
• Automated Internal Cardioverting Defibrillators (AICD)
• Ablation
• IVC Filter placement
• Closure devices (ASD and PFO)
• Transcatheter aortic valve implantation (TAVI)
  ○ trans-femoral
  ○ trans-apical
  ○ alternative routes
• Transcatheter pulmonary valve (TPV)	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date

• immediate post procedure care:
  ○ initial observations to include limb and groin
  ○ location of insertion and puncture site (arterial, venous)
  ○ awareness of device insertion method and valve type (expandable/self-expanding)
  ○ correct positioning and use of pressure devices post procedure:
  ■ FemStop
  ■ TR band
  ○ local procedure for haemorrhage and control of bleeding
  ○ ECG monitoring
• continuing post procedure:
  ○ antiplatelet therapy
  ○ adjunctive pharmaceutical agents
  ○ ECG monitoring
  ○ echocardiogram
  ○ awareness of potential complications:
  ■ thrombosis
  ■ structural failure
  ■ conduction defect	

C18 12 Lead ECG Interpretation

You must be able to demonstrate through discussion essential knowledge of (and its application to your supervised practise):	Competence Fully Achieved. Signed by assessor / Date
• Anatomical location of the 12 lead views and their relation to coronary arteries • Indication for right side and posterior ECGs	

Knowledge and recognition of the following pathologies:
• Cardiac axis and the causes of deviation
• Currents of
  ○ ischaemia
  ○ injury
  ○ infarction
• Pericarditis
• Atrio-ventricular heart blocks
  ○ type 1
  ○ type 2
  ○ type 3, complete heart block
• Intraventricular blocks
  ○ left bundle branch block
  ○ right bundle branch block
  ○ left anterior fascicular-block
  ○ left posterior fascicular-block
• Accessory pathways
  ○ Wolff-Parkinson-White (WPW) Syndrome
• Hypertrophy patterns
  ○ atrial
  ○ ventricular
• Pulmonary embolism	

You must be able to undertake the following in a safe and professional manner:	Competence Fully Achieved. Signed by assessor / Date
• Perform 12 lead ECG and interpret • Escalate acute changes as per local policy • Follow the ACS pathway • Pharmaceutical interventions/adjuncts and their complications	

Abbreviation List & glossary of terms

ABG	Arterial Blood Gas	**LAFB**	Left Anterior Fascicular Block
ACHD	Adult Congenital Heart Disease	**LBBB**	Left Bundle Branch Block
ALS	Advanced Life Support	**LMS**	Left Main Stem (Artery)
ANTT	Aseptic Non-Touch Technique	**LPFB**	Left Posterior Fascicular Block
ASD	Atrial Septal Defect	**MDT**	Multidisciplinary team
AVSD	Atrio-Ventricular Septal Defect	**NPWT**	Negative Pressure Wound Therapy
CABG	Coronary Artery Bypass Grafts	**OPCAB**	Off Pump Coronary Artery Bypass
CALS	Cardiac Advanced Life Support	**PAFC**	Pulmonary Artery Floatation Catheter
CHF	Congestive Heart Failure	**PCA**	Patient Controlled Analgesia
CMV	Cytomegalovirus	**PCI**	Percutaneous Coronary Intervention
CO	Cardiac Output	**PFO**	Patent Foramen Ovale
CPB	Cardiopulmonary Bypass	**RBBB**	Right Bundle Branch Block
CRT	Cardiac Resynchronisation Therapy	**RCA**	Right Coronary Artery
CTO	Chronic Total Occlusion	**SVR**	Systemic Vascular Resistance
Cx	Circumflex (Artery)	**TAVI**	Transcatheter Aortic Valve Implantation

DNAR	Do Not Attempt Resuscitation	**TPV**	Transcatheter Pulmonary Valve
EACTS	European Association for Cardio-Thoracic Surgeons	**VAD**	Ventricular Assist Device
ECG	Electrocardiogram	**VAP**	Ventilator Associated Pneumonia
ECMO	Extracorporeal Membrane Oxygenation	**VATS**	Video Assisted Thorascopic Surgery
GUCH	Grown Up Congenital Heart Disease	**VSD**	Ventricular Septal Defect
ILS	Immediate Life Support		
LA	Left Atria		
LAAO	Left Atrial Appendage Occlusion		
LAD	Left Anterior Descending (Artery)		

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Notes