

Post-certification competencies and cardiovascular care delivery

A joint position statement by the European Society of Cardiology and Union of European Medical Specialists Cardiology Section

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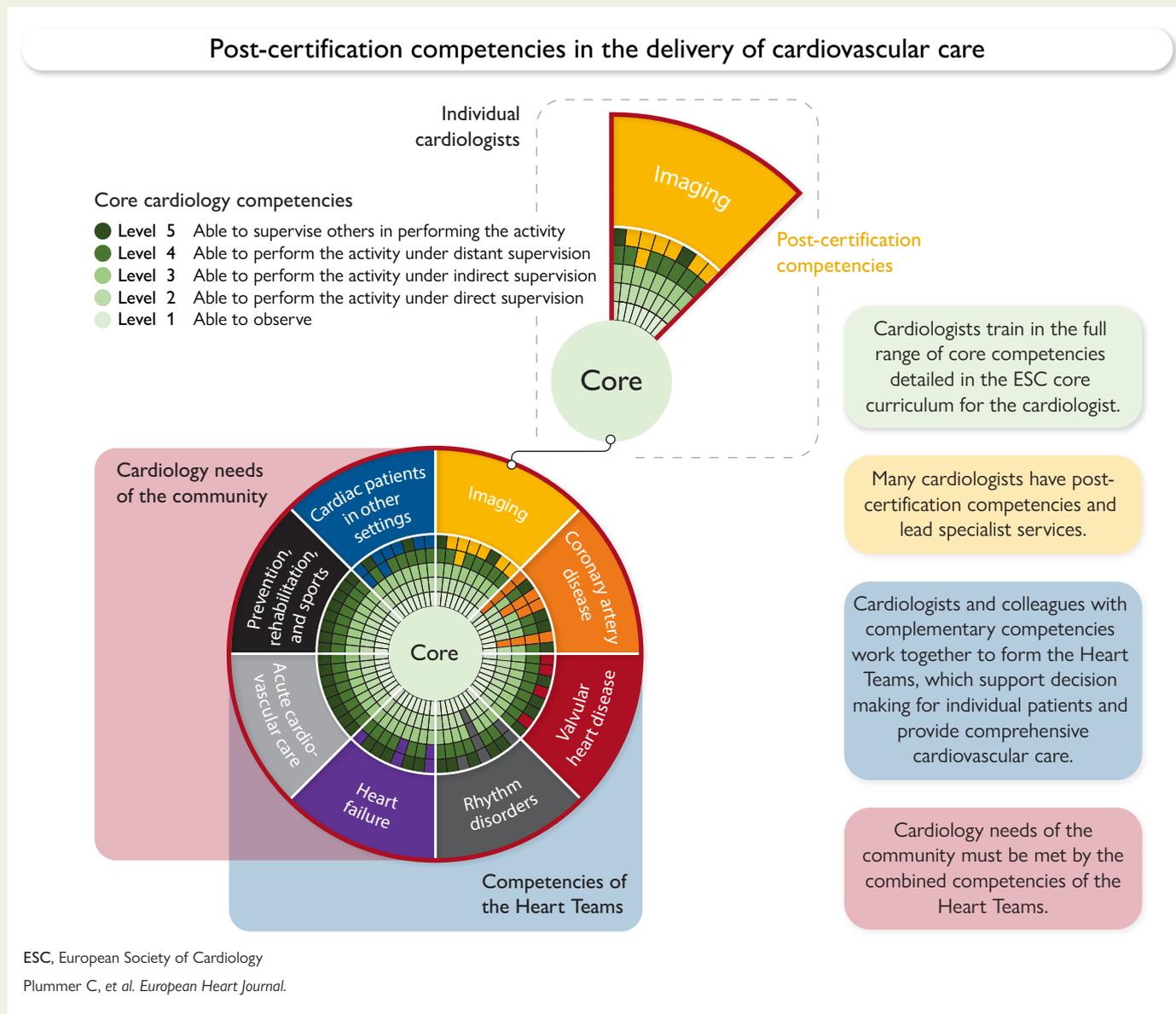
Abstract

All doctors require broad-based clinical knowledge, skills, and attitudes, but no doctor can be independently competent in every aspect of clinical practice. Within cardiology, core training equips cardiologists with core cardiovascular competencies, but appropriate training, assessment, and maintenance of post-certification competencies are required for cardiologists to function as part of a comprehensive multidisciplinary Heart Team across the full spectrum of cardiovascular practice required by our patients. This position statement describes the role of post-certification competencies in the delivery of cardiovascular care.

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Graphical Abstract



The role of post-certification competencies in the delivery of comprehensive cardiovascular care.

Keywords

Education • Training • Curriculum • Post-certification competencies • Entrustable professional activities

Background

The primary role of a doctor is to meet the healthcare needs of their community,¹ and as cardiologists, we strive to reduce the burden of cardiovascular disease.²

The practice of cardiovascular medicine requires cardiologists to recognize that first we are doctors with common roles, duties, and responsibilities to our patients, as described in the Canadian Medical Education Directives for Specialists (CanMEDS).¹ Second, that we specialize in cardiovascular medicine, and third, that many of us have post-certification competencies in the areas described by the

European Society of Cardiology (ESC) Core Curriculum for the Cardiologist.³

Cardiology is a specialty of multiple overlapping 'sub-specialties'. This is reflected in our scientific associations,⁴ working groups,⁵ councils,⁶ congresses,⁷ journals,⁸ certification processes,⁹ and clinical practice. The balance between internal medicine, cardiology, and post-certification competencies varies between cardiologists as a result of different interests, training, clinical practice settings, and, most importantly, the needs of our patients. To meet these needs, it is essential that cardiologists maintain appropriate competence at all three of these levels (*Graphical Abstract*).

The need for specialization in medicine

As medical knowledge and treatment options have expanded, advanced healthcare systems have adopted specialization. Medicine and surgery diverged in the 19th century as surgical and anaesthetic techniques developed. Specialization by organ system and disease process then evolved with the development of medical science. No doctor can maintain sufficient knowledge to deliver comprehensive care across the breadth and depth of contemporary clinical medicine, so we must recognize our limits and collaborate with colleagues who have complementary competencies.

The role of post-certification competencies in cardiology

To provide our citizens with the best and most effective guidance for the prevention of cardiovascular disease, and for our patients with cardiovascular disease to receive optimal care, the clinician responsible for that care must have the knowledge, skills, and attitudes to deliver that aspect of care safely and independently (Level 5 independence—[Table 1](#)).

Some aspects of cardiology are so common (e.g. manage a patient with arterial hypertension or interpret an electrocardiogram (ECG)) or so urgent (e.g. manage a patient with acute coronary syndrome or electrical cardioversion for ventricular fibrillation) that all cardiologists must be able to perform these activities safely and independently. This is reflected in the ESC Core Curriculum for the Cardiologist,³ where these entrustable professional activities (EPAs) require Level 5 independence ([Table 1](#)) (shaded dark green in [Tables 2](#) and [3](#)).

However, there are many less common and/or less urgent presentations and procedures where outcomes are improved by concentrating the delivery of care in high-volume centres with high-volume clinicians (e.g. percutaneous coronary intervention,¹⁰ catheter ablation,¹¹ advanced heart failure,¹² and transvenous lead extraction¹³). This is recognized in the ESC Core Curriculum, which requires lower levels of independence at the end of core training for some EPAs (e.g. manage a patient with pulmonary hypertension, Level 3, or implantable cardioverter-defibrillator/cardiac resynchronization therapy implantation, Level 1).

The purpose of this specialization through post-certification competencies in cardiology is to ensure that the multidisciplinary Heart Team includes the cardiologists required to provide independent (Level 5)

cardiology care for our patients across all cardiovascular presentations and investigations, where these are not part of core training (shaded yellow in [Tables 2](#) and [3](#)). This is recognized in the Core Curriculum³ as the training taking place after at least 5 years of medicine and cardiology ([Figure 1](#)).

Post-certification competency training in cardiology

Training in core cardiology follows a structured programme of teaching, clinical practice, supervision, and assessment covering the core EPA requirements ([Tables 2](#) and [3](#)) over usually 3–4 years ([Figure 1](#)), as detailed in the ESC Core Curriculum for the Cardiologist and Cardiology European Training Requirements.³ Additional post-certification training in a group of related EPAs may take place immediately after core training as part of a structured programme, or later with more experienced cardiologists developing additional competencies as required by their patients and cardiology unit, through courses, mentoring, proctoring, and continuing professional development. This later post-certification competency training will always be necessary to ensure that the evolving needs of the population are served and to develop skills in the many new and evolving areas of clinical practice. Both training routes should include the same assessments of independence against the required EPAs, overseen by appropriate trainers, specialist societies, and/or governmental bodies.

Organization of post-certification competencies within cardiology

There are groups of presentations and procedures that require linked knowledge, skills, and attitudes. These are grouped into the chapters of the ESC Core Curriculum—imaging, coronary artery disease, valvular heart disease, heart rhythm disorders, heart failure, acute cardiovascular care, prevention, rehabilitation, and sports and cardiac patients in other settings.³ Individual cardiologists may acquire and practice post-certification competencies in a group of topics across chapters of the curriculum, or specific topics within a single chapter, such as structural heart disease intervention or invasive cardiac electrophysiology, depending on the needs of their population and the organization of their practice.

No cardiologist can achieve and maintain Level 5 independence in all areas of cardiology, so cardiologists with complementary skills must work together as a Heart Team³ to provide comprehensive care for their population. The Heart Team will contain members necessary

Table 1 Definitions of levels of independence for professional activities

Level 1: Trainee is able to observe
Level 2: Trainee is able to perform the activity under direct supervision proactive, close supervision, supervisor in the room
Level 3: Trainee is able to perform the activity under indirect supervision reactive, on-demand supervision, trainee has to ask for help, supervisor readily available, within minutes
Level 4: Trainee is able to perform the activity under distant supervision reactive supervision available remotely, e.g. within 20–30 min, on the phone or <i>post hoc</i>
Level 5: Trainee is able to supervise others in performing the activity

Source: ESC Core Curriculum for the Cardiologist, [Table 2](#).³

Table 2 The entrustable professional activities specified in the ESC Core Curriculum for the Cardiologist and the levels of independence required for completion of training

EPA	Level of independence				
	1	2	3	4	5
2. Imaging					
2.1. Assess a patient using one or multiple imaging modalities					
2.2. Assess a patient using echocardiography					
2.3. Assess a patient using cardiac magnetic resonance					
2.4. Assess a patient using cardiac computed tomography					
2.5. Assess a patient using nuclear techniques					
3. Coronary artery disease					
3.1. Manage a patient with symptoms suggestive of coronary artery disease					
3.2. Manage a patient with acute coronary syndrome					
3.3. Manage a patient with chronic coronary syndrome					
3.4. Assess a patient using coronary angiography					
4. Valvular heart disease					
4.1. Manage a patient with AR					
4.2. Manage a patient with AS					
4.3. Manage a patient with mitral regurgitation					
4.4. Manage a patient with mitral stenosis					
4.5. Manage a patient with tricuspid regurgitation					
4.6. Manage a patient with tricuspid stenosis					
4.7. Manage a patient with pulmonary regurgitation					
4.8. Manage a patient with pulmonary stenosis					
4.9. Manage a patient with multivalvular disease					
4.10. Manage a patient with a prosthetic valve					
4.11. Manage a patient with endocarditis					
5. Rhythm disorders					
5.1. Manage a patient with palpitations					
5.2. Manage a patient with transient loss of consciousness					
5.3. Manage a patient with atrial fibrillation					
5.4. Manage a patient with atrial flutter					
5.5. Manage a patient with supraventricular tachycardia					
5.6. Manage a patient with ventricular arrhythmia					
5.7. Manage a patient with bradycardia					
5.8. Manage a patient with a cardiac ion channel dysfunction					
5.9. Manage a patient with a pacemaker					
5.10. Manage a patient with an ICD					
5.11. Manage a patient with a CRT device					
6. Heart failure					
6.1. Manage a patient with symptoms and signs of heart failure					
6.2. Manage a patient with heart failure with reduced ejection fraction					
6.3. Manage a patient with heart failure with preserved ejection fraction					
6.4. Manage a patient with acute heart failure					
6.5. Manage a patient with cardiomyopathy					
6.6. Manage a patient with pericardial disease					
6.7. Manage a patient with right heart dysfunction					
6.8. Manage a patient with a cardiac tumour					
6.9. Manage cardiac dysfunction in oncology patients					
7. Acute cardiovascular care					
7.1. Manage a patient with haemodynamic instability					
7.2. Manage a patient with survived cardiac arrest					
7.3. Manage a critically ill cardiac patient					
7.4. Manage a patient after a percutaneous cardiovascular procedure					
7.5. Manage a patient after cardiac surgery					
7.6. Manage end-of-life care in a cardiac patient					
8. Prevention, rehabilitation, sports					
8.1. Manage cardiovascular aspects in an athlete (Sport Cardiology)					
8.2. Manage a patient with arterial hypertension					
8.3. Manage a patient with dyslipidaemia					
8.4. Manage cardiovascular aspects in a diabetic patient					
8.5. Manage a cardiac patient in primary prevention					
8.6. Manage a cardiac patient in secondary prevention					
8.7. Prescribe a prevention and rehabilitation programme for a cardiovascular patient					
9. Cardiac patients in other settings					
9.1. Manage a patient with aortic disease					
9.2. Manage a patient with trauma to the aorta or the heart					
9.3. Manage a patient with peripheral artery disease					
9.4. Manage a patient with thromboembolic venous disease					
9.5. Manage a patient with pulmonary thromboembolism					
9.6. Manage a patient with pulmonary hypertension					
9.7. Manage a patient with adult congenital heart disease					
9.8. Manage a pregnant patient with cardiac symptoms or disease					
9.9. Perform a cardiological consultation					

Source: Adapted with permission from the ESC Core Curriculum for the Cardiologist, Table 3.³

Table 3 The cardiovascular investigations and treatments specified in the ESC Core Curriculum for the Cardiologist and the levels of independence required for completion of training

Investigations	Levels of independence				
	1	2	3	4	5
ECG	1	2	3	4	5
Ambulatory ECG	1	2	3	4	5
Exercise ECG testing	1	2	3	4	5
Cardiopulmonary exercise testing	1	2	3	4	5
Ambulatory BP monitoring	1	2	3	4	5
Transthoracic echocardiography	1	2	3	4	5
Trans-oesophageal echocardiography	1	2	3	4	5
Stress echocardiography	1	2	3	4	5
Vascular ultrasound	1	2	3	4	5
Coronary CT	1	2	3	4	5
Cardiac CT	1	2	3	4	5
Cardiac MR	1	2	3	4	5
Nuclear imaging	1	2	3	4	5
Right heart catheterization	1	2	3	4	5
Endomyocardial biopsy	1	2	3	4	5
Coronary angiography	1	2	3	4	5
Percutaneous interventions	1	2	3	4	5
Structural interventions	1	2	3	4	5
Cardiac surgery	1	2	3	4	5
Pacemaker programming	1	2	3	4	5
ICD/CRT programming	1	2	3	4	5
Temporary pacemaker implantation	1	2	3	4	5
Permanent pacemaker implantation	1	2	3	4	5
ICD/CRT implantation	1	2	3	4	5
Electrophysiological studies	1	2	3	4	5
Electrophysiological interventions	1	2	3	4	5
Electrical cardioversion	1	2	3	4	5
Pericardiocentesis	1	2	3	4	5

Source: Adapted with permission from the ESC Core Curriculum for the Cardiologist, Table 4.³

for the care of the patients for which they are responsible. For example, in the care of patients with valvular heart disease, the team will contain imaging specialists, interventional cardiologists, cardiac surgeons, anaesthetists, and nurses. This may be located in a single hospital, or more commonly, shared between hospitals in a geographical area, using video conferencing and telemedicine as appropriate for needs of their population and the resources available.

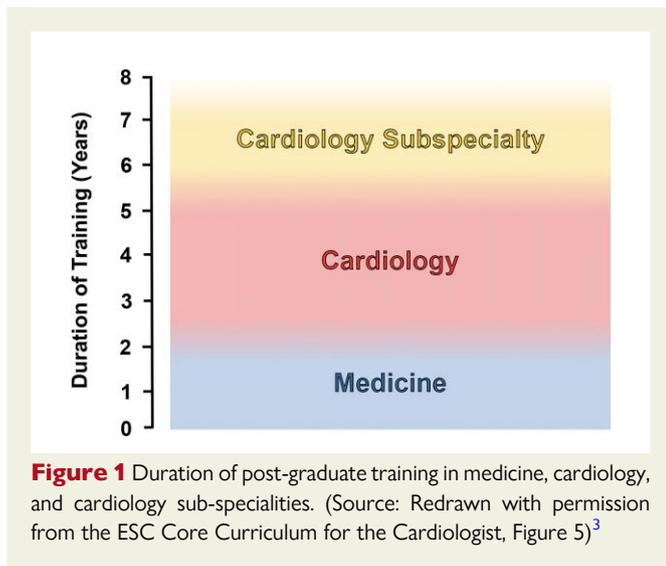
There must be close collaboration between cardiologists with different post-certification competencies, such as heart failure specialists, interventional cardiologists, and electrophysiologists, and between specialists with different training backgrounds, such as internal medicine, radiology, and cardiothoracic surgery, to evaluate cardiovascular disease, plan management, and perform procedures. This requires a team of clinicians to develop complementary or overlapping competencies. Entrustable professional activities within specific curricula should be used for the assessment of post-certification competencies, and these should be shared between collaborating specialities.

Cardiologists should provide the over-arching care for patients with cardiovascular disease, and as far as possible, they should interpret

investigations and perform interventions for their patients to ensure that care is delivered in the context of their patients' overall cardiovascular disease process, specialty guidelines, and research. When this is not possible, a specialist in a specific technique may report an investigation or perform an intervention as part of the wider clinical team, with interpretation and ongoing management remaining with the responsible cardiologist.

Maintaining competence

During core cardiology training, there are multiple opportunities to experience a wide range of cardiology presentations and procedures and to undertake structured professional development and assessment. This must continue throughout independent practice to ensure that there are sufficient cardiologists with the appropriate skills to deliver all aspects of cardiology care and support the safe use of new technologies for our patients. Cardiologists must know the limits of their abilities and ask the opinions and assistance of colleagues whenever appropriate.



No matter how high the proportion of post-certification competency work in their clinical practice, all cardiologists must maintain their ability to deliver the internal medicine, core, and post-certification competencies appropriate to their role, so that they can undertake the holistic assessment of cardiovascular patients and offer them the most appropriate treatment options in their individual clinical context. This requires appropriate continuing professional development, peer review, and audit at all levels of practice.

Recommendations

- (1) Cardiology training must be fully aligned with best clinical practice to achieve the appropriate standards of knowledge, skills, and attitudes across the cardiology workforce.
- (2) Cardiologists must be supported by their healthcare systems to acquire and maintain the post-certification competencies required to provide optimal care to the population they serve, with equity of access for all.
- (3) Cardiologists should reflect on their clinical practice and, in collaboration with colleagues at their institution, determine the appropriate balance between internal medicine, core cardiology, and post-certification competencies and ensure that they maintain appropriate continuing professional development across their range of practice.
- (4) Healthcare organizations should plan the cardiology workforce, and their required knowledge and skills, according to the projected needs of the population and the local organization of healthcare delivery.

Supplementary data

Supplementary data are not available at [European Heart Journal](https://www.escardio.org) online.

Declarations

Disclosure of Interest

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Data Availability

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