EUROPEAN SOCIETY OF CARDIOLOGY®

Acute Cardiovascular Care Association ACCA
A Registered Branch of the ESC

ACCA WHITE BOOK

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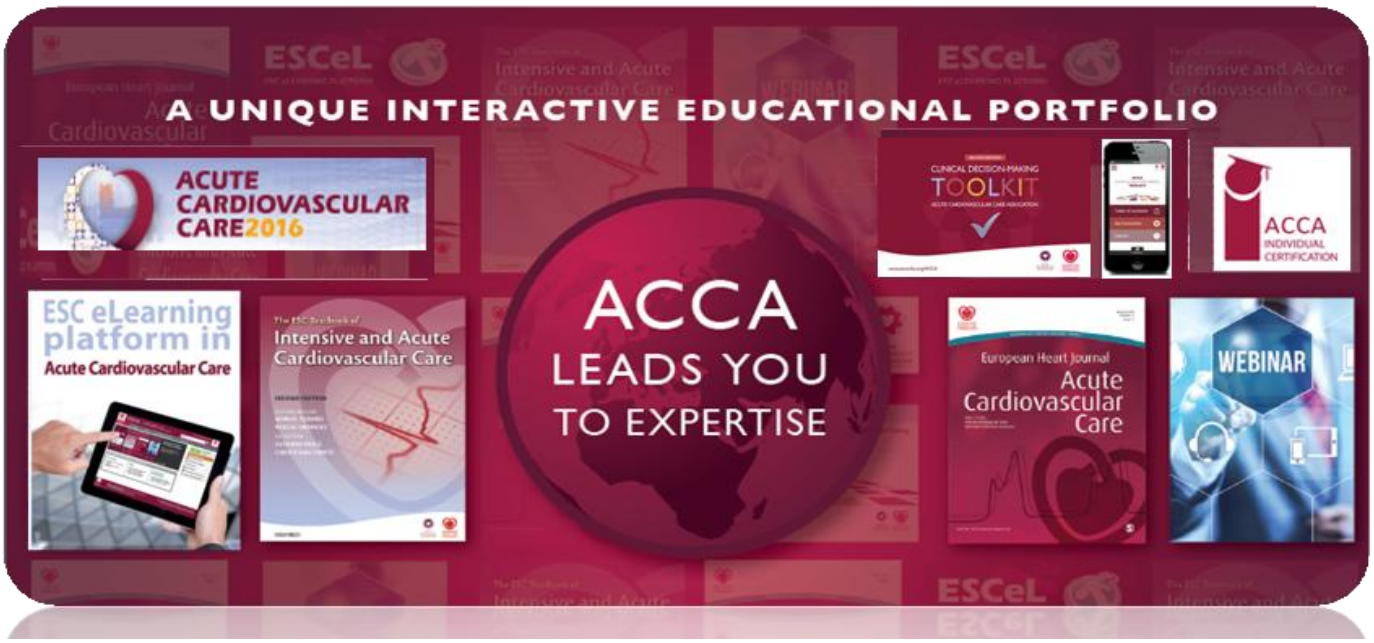

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Preface: The ACCA White Book 2016: first edition

The management of acute cardiovascular diseases at a national level encompasses a complex relationship between professionals of different backgrounds and specialties, the organisation of the different levels of the healthcare system —pre-hospital care, emergency departments and hospital units—, available resources and local policies and cultures.

This complexity makes difficult to have recommendations for the management of patients with acute cardiovascular diseases that are valid in all environments and applicable in all countries. Moreover such organizational differences between countries in approaching the acute patient might translate into significant variations in outcome, thus making it necessary to look for any improvement.

The ACCA White Book is the first attempt to describe with detail the peculiarities of acute cardiovascular care in Europe. For that, Dr. Eric Bonnefoy with a large team of national experts has developed an analysis of most of the European and ESC-affiliated countries.

This includes basic statistics, resources, organisation, specialists and units involved, reimbursement policies and, interestingly, identification of difficulties for optimal acute cardiovascular care.

The ACCA White Book is a unique piece of information to understand the needs and the challenges to improve acute cardiovasculare care and, at the end to help achieving the ESC mission "to reduce the burden of cardiovascular disease in Europe".

Scope and Methodology

The ACCA White Book 2016 is the first edition of a project that was launched in an attempt to understand the national realities with regard to management of Acute Cardiac Care.
Our model has been the EHRA's WHite Book that provides every year an outstanding overview of management of cardiac arrhythmias in countries member of the European Society of Cardiology.
For each country, the document provides information on the following topics:

- How the Health Care System is organised to manage acute cardiac care?
- How hospitals are reimbursed for acute cardiac care patients?
- National or large regional registries
- Guidelines adhered to for the management of acute cardiac patients
- Education
- Specialists required for technical procedures in acute cardiac care
- Management of some common pathologies in acute cardiac care
- Units that manage patients who need acute cardiac care
- Sites and units that manage patients who need acute cardiac care
- What are the main difficulties encountered with acute cardiac care in the country?

The document has been built with the National representatives for the ACCA in each country member of the European Society of Cardiology. Each was responsible for compiling information about his/her country based on a questionnaire. The document in progress was circulated by e-mail and edited by all members of the group.
For each country the ACCA White Book provides an overlook on demographic and socioeconomic context, health status and mortality indicators, health services, health expenditure and health system coverage and utilization, human resources for health services. The sources for demographic, economic and health organisations came from the European Core Health Indicators last accessed in May 2016.
(http://ec.europa.eu/health/indicators/echi/index_en.htm).

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AUSTRIA

Demographic and socioeconomic context

Population (x1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
8477	18.2	20.0	68	46 165

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
46	18.4	18.8	9.4	538.1	199.9

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
3.3	26.6	11.0	16.3	15.8

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
499	46	27	77	110	787	14	55

*per 100 000 population

1. Name of National Cardiac Society (NCS)

Austrian Society of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Working Group of Cardio-Vascular-Intensive Care Medicine
This working group is part of the Federation of Austrian Societies of Intensive Care Medicine (FASIM)

3. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

Acute pre-hospital care is mainly organized by the different providers of ambulances and a variety of emergency companies. It is usual for emergencies to be attended by an emergency doctor. Additionally, there are several helicopter organizations providing emergency medicine in Austria, mainly during day time.

- **In hospitals**

Most hospitals in Austria have emergency departments. First response systems are mainly responsible for the initial acute care of cardio vascular patients and will contact cardiologists when necessary for further interventions.
There are some efforts to develop chest pain units for a more specific path with respect to acute cardiac care.

4. How hospitals are reimbursed for acute cardiac care patients

All hospitals are reimbursed by insurance agencies

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement or incentives

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

Restricted to certain number of treatments/budget per year (in the case of device therapies)

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		
Acute heart failure		X	
Cardiac arrest	X		

- **Availability of a national quality insurance system or complication registry**

Yes: A-IQUI

6. Guidelines adhered to for the management of acute cardiac patients

National Cardiac Society **No**
U.S. **No**
European **No**

7. Education

- **National certification available for acute cardiac care**

For physician?

Yes, it is required for practice (for a career in CCU). In smaller hospitals there are No requirements for a certification

For allied professionals?

Yes, but itis not required for practice

For training centres?

Yes, itis required for practice

- **National Cardiac Society supporting ACCA certification system**
  No

- **Official national competency guidelines for acute cardiac care organisation?**

Only for some entities are national guidance available (cardiogenic shock; devices, ECMO)

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**
  Yes, required

- **Training centres availability. Please comment on acute cardiac care training in your country.**

Most training facilities are localized at the medical universities or some tertiary hospitals

8. Specialists required for technical procedures in acute cardiac care

List the specialties and units that are intervening in acute cardiac patients' management in the country.

Technical procedures	**Specialty of the specialists**	**Where? (type of hospitalisation units)**
Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (1 is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologist, Intensivist	Angio Lab, ICU
Hypothermia	Internists, Cardiologists	ICU
Mechanical ventilation	Internist, Cardiologists, Anaesths.	ICU
Dialysis	Internist, Cardiologists, Anaesths.	ICU
Endomyocardial biopsy	Cardiologist	Angio Lab
Percutaneous coronary angioplasty	Cardiologist	Angio Lab
ECMO/ECLS	Cardiologist, Surgeon, Intensivist	ICU; Angio Lab, Emergency Dep.
Non invasive ventilation	All physicians	IMCU / ICU
Insertion and monitoring of an arterial lines	All physicians	IMCU / ICU
Insertion and monitoring of a central venous catheter	All physicians	IMCU / ICU / emergency depart.
Insertion and monitoring of a pulmonary artery catheter	Cardiologist; Anaesthesiologist Intensivist	IMCU / ICU
Pericardiocentesis	Cardiologist, Surgeon	IMCU / ICU / Emergency depart.
Transvenous temporary pacing	Internist, Cardiologist	IMCU / ICU / Emergency depart.
Echocardiography transesophagial	Internists, Cardiologists	Labs, IMCU / ICU, Emergency depart.
Direct current cardioversion	Internists, Cardiologists	ICMU / Emergency department
Echocardiograhy transthoracic	Internists, Cardiologists	Labs, IMCU / ICU, Emergency depart.

9. Management of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Acute Cardiac Care diagnosis	Number per year	Specialists managing the pathology	Where? (type of hospitalisation units and sites)
Selected pathologies considered as representative of acute cardiac care patients		*Specialties that are intervening on a common basis. Priorities are indicated by numbers (1 is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated		Internists, Cardiologists	IMCU , CCU
NSTEMI		Internists, Cardiologists	IMCU , CCU
Sudden cardiac death		All physicians	IMCU / ICU / Emergency depart.
Pericarditis non complicated		Internists, Cardiologists	IMCU / CCU
Cardiogenic shock		Internists, Cardiologists	ICU / IMCU / Emergency departments
Cardiac tamponade		Internists, Cardiologists	ICU / IMCU / Emergency departments
Type A aortic dissection		Cardiologist, Surgeon	ICU / IMCU / Emergency departments Surgery
Conduction disturbances with syncope		Internists, Cardiologists	Ward, Syncope units, IMCU, ICU
pulmonary edema		Internists, Cardiologists	ICU / IMCU / Emergency departments
Non-complicated type B dissection		Internist, Cardiologist Surgeon	ICU / IMCU / Emergency departments

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country? **Yes** Manage acute cardiac care patients? **No** Managed mostly by intensivists **No**	Common in country? **Yes** Manage acute cardiac care patients? **Yes** Managed mostly by intensivists **Yes**	Common in country? **Yes** Mostly in academic hospitals? **No**	Common in country? **Yes** Mostly in academic hospitals? **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists	Common in country **Yes** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**

	YesNo ☐	YesNo ☐		
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

In Austria we have currently four Medical Universities, soon increasing to five. Additionally, there are several tertiary hospitals mainly in the alpine region which are staffed with cardiologists. However, there are many smaller hospitals which do not have specialists in cardiology. That does not mean that these units are not adequately supported by physicians who may have training in cardiology, but do not have all the appropriate certificates.

12. What are the main difficulties (1= No to 5=very high) encountered with acute cardiac care in the country?

There are few difficulties in Austria.

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of reimbursement,	1	X				
Lack of referral	1	X	X			
Lack of centres	2		X			
Limited financial resources	2		X			
Lack of trained personnel	2		X			
Lack of operators	2		X			
Low awareness of guidelines	3			X		

BELGIUM

Demographic and socioeconomic context

Population (x1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
11178	17.1	19.9	97	42 725

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
27	20.2	17.8	9.5	559.5	149.2

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
1.7	16.6	11.2	15.6	19.9

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
295	38	43	112	82	952	11	47

*per 100 000 population

1. Name of National Cardiac Society

Belgian Society of Cardiology (BSC), affiliated with the ESC

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Belgian Interdisciplinary working group of acute cardiology (BIWAC)

3. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

Call to central emergency number activates an Emergency medical service (EMS) which is controlled by local hospitals. Patients are handled according to local rather than national algorithms, and are admitted to the nearest hospital (of the EMS), unfortunately not according to the suspected pathology and the treatment required (for example PCI facilities for STEMI). Networks are only locally organised, which is not mandated by the national or regional government.

- **In hospitals**

Initially, primary PCI has been performed in tertiary centres with onsite cardiac surgery ('B3 centres'). STEMI networks have been developed over time on a locality basis. Recently, the Belgian government has decided to open new catheter laboratories (including centres without cardiac surgery on site, called B2 centres) leading to a reduction in inter-hospital transfers. Most patients recieve primary PCI on site (90 %). For non PCI-centres, as stated above, STEMI network may be locally organized in order to offer primary PCI and to treat cardiogenic shock. However, this has only recently become mandatory.

4. How hospitals are reimbursed for acute cardiac care patients

& Hospitals are reimbursed via Belgian Health Insurance. Payments are defined by the Belgian federal government and are mainly based on interventions.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician receives per patient or medical intervention reimbursement

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

Restricted to certain number of treatments/budget per year

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes			STEMI registry (chair by Prof Dr Marc Claeys)
Acute heart failure			
Cardiac arrest			

- **Availability of a national quality insurance system or complication registry**

Yes

STEMI registry, BIWAC initiative

PCI registry, Quermid registry (belongs to federal government):

6. Guidelines adhered to for the management of acute cardiac patients

National Cardiac Society **Yes**
U.S. **No**
European **Yes**, with national specific recommendations

7. Education

- **Is there a national certification available for acute cardiac care?**

For physicians?

Itis required for practice in intensive care but not for CCU. The Certificate of intensive care can be obtained by cardiologists, fellows in internal medicine or anesthesiologists.

For allied professionals?

Yes, itis required for practice

For training centres ?

No

- **National Cardiac Society supporting ACCA certification system**
  No

- **Official national competency guidelines for acute cardiac care organisation?**
  No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**
  Yes, required

- **Training centres availability. Please comment on acute cardiac care training in your country.**

& Fellows have to become certified in intensive care to have access to invasive monitoring and treatment techniques (dialysis, invasive ventilation …). The certificates are organised by universities on a regional basis (French – Dutch speaking) and include theoretical and practical aspects. There is specific training for acute cardiac care.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	cardiologist	ICCU – ICU - CCU
Hypothermia	Cardiologist - intensivist	ICU - ICCU
Mechanical ventilation	Cardiologist - intensivist	ICU - ICCU
Dialysis	Intensivist	ICCU/nephrology or ICU
Endomyocardial biopsy	Cardiologist	Angio lab
Percutaneous coronary angioplasty	Cardiologist	Angio lab
ECMO/ECLS	Intensivist	ICU - ICCU
Non invasive ventilation	Cardiologist Intensivist	ICCU ICU or Emergency department
Insertion and monitoring of an arterial lines	Cardiologist Intensivists	ICCU - ICU - CCU
Insertion and monitoring of a central venous catheter	Cardiologist Intensivists	ICCU - ICU - CCU
Insertion and monitoring of a pulmonary artery catheter	Cardiologist	ICCU – ICU - CCU
Pericardiocentesis	Cardiologist - Intensivists	ICCU – cath lab - CCU
Transvenous temporary pacing	Cardiologist -Intensivists	CCU- ICU - ICCU
Echocardiography transesophagial	Cardiologist	CCU- ICU - ICCU
Direct current cardioversion	Cardiologist - intensivists	CCU – ICU- ICCU
Echocardiograhy transthoracic	Cardiologist	CCU - ICU- ICCU

ICCU – intensive cardiac care unit. This is uncommon in Belgium; Most of centres have CCU (coronary care unit) and ICU. CCU are an intermediate care unit (patients without any end-organs dysfunction); ICU – intensive care unit

9. Managements of some common pathologies in acute cardiac care

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated		Cardiologist (Intensivist)	ICCU in tertiary care and ICU in secondary care
NSTEMI	NA	Cardiologist (in nearest hospital intensivist or internal medicine physician)	ICCU or intermediate care ICU
Sudden cardiac death	NA	Cardiologist (in nearest hospital intensivist)	ICCU or in nearest hospital ICU
Pericarditis non complicated	NA	Cardiologist	Cardiology or internal medicine
Cardiogenic shock	NA	Intensivists - Cardiologist	ICCU - ICU
Cardiac tamponade	NA	Cardiologist	ICCU - ICU
Type A aortic dissection		Cardiologist/cardiovascular surgeon)	ICCU - ICU
Conduction disturbances with syncope		Cardiologist	ICCU or ICU
Pulmonary edema		Cardiologist	ICCU or ICU
Non-complicated type B dissection		Cardiologist/cardiovascular surgeon	ICCU or department of vascular/cardiac surgery

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mied Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: eclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
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11. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	X				
Lack of reimbursement,	1	X				
Lack of referral	2		X			
Lack of trained personnel	2		X			
Lack of operators	2		X			
Limited financial resources	3			X		
Low awareness of guidelines	4				X	

BULGARIA

Demographic and socioeconomic context

Population (x1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
7265	18.7	15.9	71	16 324

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
39	23.2	28.4	15.0	932.9	592.0

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
4.7	30.6	7.6	11.7	39.6

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
398	…	…	63	133	447	10	4

*per 100 000 population

Name of National Cardiac Society

Bulgarian Society of Cardiology

1. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

WG of ACS

2. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

1. Centralized emergency system in response to 112 telephone in all regions – usually used
2. On call GP service – non usually used for emergencies

No STEMI network, but usually transportation time is less than 120 min from anywhere in the country
No special network for HF or other cardiac disease

- **In hospitals**

Emergency departments in most hospitals – public and private - for critically ill patients - specialized ICCU or dedicated cardiology beds in ICU, supervised by cardiologist.
For some non-critically ill patients – cardiology departments or dedicated cardiology beds in internal medicine departments, supervised by cardiologist.
No ED, No ICU or ICCU in small private catheter labs

3. How hospitals are reimbursed for acute cardiac care patients

Per patient reimbursement. A system of flat rate packages for pre-established pathologies and interventions. Comorbidities are not reimbursed in addition. There is separate reimbursement for some devices – coronary stents, CRT. Pacemakers – full cover of the market price.
ICD and ablation for AF – co-payment from patient.
LVADs (incl IABP), aortic stents – not covered by National insurance fund, entirely paid by patients.
TAVI – reimbursed for restricted number of procedures per year after selection by special national committee.
Special additional reimbursement per patient for each day in ICU/ICCU in big hospitals (required at least 7 anaesthesiologists per hospital)

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement nor incentives

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment has to follow the ESC guidelines
Restricted to certain number of treatments/budget per year

4. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes		X	
Acute heart failure		X	
Cardiac arrest		X	

- **Availability of a national quality insurance system or complication registry**

No

5. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**No**
U.S.	**No**
European	**Yes**

6. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No

For allied professionals?

No

For training centres?

No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Yes suggested Months 7

- **Training centres availability. Please comment on acute cardiac care training in your country.**

There is No special list of training centres. Each ICU/ICCU could be a training centre if there is one cardiologist with 5 years experience after board certification.

7. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	1. Interventional cardiologists (most common) 2. Cardiac surgeons (less often)	1. In cath lab 2. In ICU/ ICCU
Hypothermia	Not used in Bulgaria	
Mechanical ventilation	1. Intensivist cardiologist 2. Anaesthesiologist	1. ICU/ICCU 2. ED during CPR
Dialysis	1. Nephrologists 2. Anaesthesiologist	1. ICU/ICCU
Endomyocardial biopsy	Interventional cardiologist	Cath lab
Percutaneous coronary angioplasty	Interventional cardiologist	Cath lab
ECMO/ECLS	ECMO is not used in Bulgaria, some LVADs available in operating rooms in cardiac surgery departments	
Non invasive ventilation	1. Intensivist (cardiologist) 2. Anaesthesiologist	ICCU/ICU
Insertion and monitoring of an arterial lines	1. Intensivist (cardiologist) 2. Anaesthesiologist	ICCU/ICU
Insertion and monitoring of a central venous catheter	1. Intensivist (cardiologist) 2. Anaesthesiologist	ICCU/ICU
Insertion and monitoring of a pulmonary artery catheter	1. Intensivist (cardiologist) 2. Anaesthesiologist 3. Interventional cardiologist	ICCU/ICU Cath lab
Pericardiocentesis	1. Cardiac surgeon 2. Interventional cardiologist 3. Intensivist (cardiologist)	Operating room Cath lab ICCU
Transvenous temporary pacing	1. Intensivist (cardiologist) 2. Anaesthesiologist 3. Interventional cardiologist	ICCU/ICU Cath lab
Echocardiography transesophagial	1. Board certified experts in TOE (cardiologists)	ICCU/ICU Echo departments/cabinets
Direct current cardioversion	1. Intensivist (cardiologist) 2. Anaesthesiologist 3. every physician or trained nurse during CPR	ICCU/ICU ED (only during CPR)
Echocardiograhy transthoracic	1. Intensivist (cardiologist) 2. Board certified cardiologist in TTE (basic level)	ICCU Echo departments/cabinets

8. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	NA	1. Interventional cardiologist 2. Intensivist – cardiologist (experienced in intensive cardiac care) 3. General cardiologist	1. Dedicated cardiology ICCU 2. dedicated cardiology beds in ICU 3. Cardiology departments – general wards in small private catheter laboratories
NSTEMI	NA	1. Interventional cardiologist 2. Intensivist – cardiologist 3. General cardiologist	1. Dedicated cardiology ICCU 2. dedicated cardiology beds in ICU 3. Cardiology departments – general wards 4. dedicated cardiologic beds in internal medicine departments
Sudden cardiac death	NA	1. Intensivist – cardiologist 2. General cardiologist	1. Dedicated cardiology ICCU 2. dedicated cardiology beds in ICU 3. Cardiology departments – general wards 4. dedicated cardiology beds in internal medicine departments
Pericarditis non complicated	NA	1. Interventional cardiologist 2. Intensivist – cardiologist 3. General cardiologist	1. Dedicated cardiology ICCU 2. dedicated cardiologic beds in ICU 3. Cardiology departments – general wards 4. dedicated cardiology beds in internal medicine departments
Cardiogenic shock	NA	1. Interventional cardiologist 2. Intensivist – cardiologist 3. General cardiologist	1. Dedicated cardiology ICCU 2. dedicated cardiology beds in ICU 3. Cardiology departments – general wards 4. dedicated cardiology beds in internal medicine departments
Cardiac tamponade	NA	1. Interventional cardiologist 2. Intensivist – cardiologist 3. General cardiologist	1. Dedicated cardiology ICCU 2. dedicated cardiology beds in ICU 3. Cardiology departments – general wards 4. dedicated cardiology beds in internal medicine departments
Type A aortic dissection	NA	1. Interventional cardiologist 2. Intensivist – cardiologist 3. General cardiologist 4. cardiac surgeon	1. Dedicated cardiology ICCU 2. dedicated cardiology beds in ICU 3. Cardiology departments – general wards 4. dedicated cardiology beds in internal medicine departments 5. cardiac surgery departments
Conduction disturbances with syncope	NA	1. Interventional cardiologist, board certified in cardiac stimulation 2. Intensivist – cardiologist 3. General cardiologist	1. Dedicated cardiology ICCU 2. dedicated cardiology beds in ICU 3. Cardiology departments – general wards 4. dedicated cardiology beds in internal medicine departments
Pulmonary edema	NA	1. Intensivist – cardiologist 2. General cardiologist	1. Dedicated cardiology ICCU 2. dedicated cardiology beds in ICU 3. Cardiology departments – general wards 4. dedicated cardiology beds in internal medicine departments
Non-complicated type B dissection	NA	1. Intensivist – cardiologist 2. General cardiologist 3. Interventional cardiologist	1. Dedicated cardiology ICCU 2. dedicated cardioloyc beds in ICU 3. Cardiology departments – general wards 4. dedicated cardiology beds in internal medicine departments

9. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**

10. Sites and units that manage patients who need acute cardiac care

1. In non-PCI hospitals – dedicated cardiology beds in ICU, supervised by cardiologist or cardiology department – general ward, usually with non-invasive monitoring available, TT echocardiography (in some cases also TOE), routine intermittent dialysis is usually available, usually non-invasive ventilation is not possible (in some cases mechanical ventilation is used in ICU), usually IABP is not available. Supervision of cardiologist is required by National insurance found for the reimbursement per cardiology diagnosis.
2. In large PCI-hospitals – dedicated cardiology ICCU supervised by cardiologist, rarely dedicated cardiology beds in ICU, supervised by cardiologist. Available non-invasive and invasive monitoring, mechanical and non-invasive ventilation, IABP (other LVADs are rare - available only in some cardiac surgery departments), routine intermittent dialysis is usually available. In some post-cardiac surgery ICU, continuous dialysis is available. Hypothermia is not used in Bulgaria. Supervision of cardiologist is required by National insurance fund for reimbursement which occurs according to cardiology diagnosis.
3. In small private catheter labs – dedicated intensive beds in general cardiology wards. IABP and 24/7 availability are required by National insurance fund for the reimbursement of interventional procedures. Usually only patients with ACS are admitted and supervised by interventional and general cardiologists.

11. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	X				
Low awareness of guidelines	2		X			
Lack of operators	2		X			
Lack of trained personnel	3					
Lack of referral	4				X	
Lack of reimbursement,	5					X
Limited financial resources	5					X

The main obstacle is inadequate reimbursement for all cardiology treatments (including interventional) and lack of any reimbursement for some treatments – aortic dissection, ICD, ablation of AF, hypothermia, LVADs. Reimbursement is available only if certain days are spent in the hospital (required minimal hospital days per diagnosis) and this is an obstacle for early transfer of some critically ill patients to big PCI hospitals with dedicated ICCU.
Reimbursement per diagnosis is equivalent irrespective of the level of hospital and treatment provided. In most dedicated cardiology beds in ICU a general cardiologist or interventional cardiologist supervises treatment, No enough trained intensivist-cardiologists in Bulgaria.

CZECH REPUBLIC

Demographic and socioeconomic context

Population (x1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
10511	17.1	17.8	74	30 445

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
36	26.8	27.0	10.4	691.9	309.7

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
2.4	20.7	7.2	14.3	15.7

*per 100 000 population

Human resources for health services

Physician*	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses*	Physician Graduates*	Nurses Graduates*
369	55	37	70	152	800	13	15

*per 100 000 population

1. Name of National Cardiac Society

Czech Society of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Acute Cardiac Care Association of Czech Society of Cardiology

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Czech Republic has established network of 22 PCI centres with 24/7 availability. Patients with STEMI (including those after cardiac arrest) are transferred directly to PCI centres. Patients with non-STEMI without ongoing ischemia and patients with acute heart failure are transferred both to regional hospitals and PCI centres (according to the regional principle). Patients with most severe forms of acute heart failure (e.g. cardiogenic shock) are usually transferred to Cardiovascular centres (see below)

- **In hospitals**

In Czech Republic, since 2010, a network of adult cardiovascular centres has been formalised. All cardiovascular centres have 24/7 PCI service. There are 11 tertiary cardiovascular centres (called complecardiovascular centres or cardiovascular centres of 1st type, with a cardiac surgery department in all these centres) and 6 cardiovascular centres of 2nd type (without cardiac surgery).
These centres usually have a dedicated intensive cardiac care unit and also dedicated cardiac intermediary care unit.
There are some differences between individual centres (e.g. in some centres prolonged mechanical ventilation is provided in ICCU whereas in some only short-term mechanical ventilation etc.)
In regional hospitals without the status of a cardiovascular centre, acute cardiac care patients (without requirement for immediate transfer to a PCI or Cardiovascular centre) are admitted either to Dept. of Internal Medicine (general medical unit) or to mixed surgical/medical units or to Dept. of Anaesthesiology Resuscitation (see also point 11)

4. How hospitals are reimbursed for acute cardiac care patients

Note: Incentives for hospitals (see below) are not an absolute rule

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement nor incentive

Hospitals

Hospital does not receive reimbursement, but incentives (e.g. more budget on the following year)

- **Treatment availability for acute cardiac care**

Restricted to certain number of treatments/budget per year

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	x		1) Participation in pilot STEMI registry (EORP 2015) – 8 centres in Czech republic 2) CZECH 2 registry (2 months cross sectional registry performed in 2012) 3) Ongoing National registry of cardiovascular interventions (includes patients with ACS managed invasively)
Acute heart failure	x		National registry AHEAD – terminated 2006-2009: 4153 AHF patients in seven PCI centers (appr. 3 million region)

- **Availability of a national quality insurance system or complication registry**

Yes, name of the registry: State institute for drug control

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **Yes**
U.S. **No**
European **Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Yes , suggested

Before board examination in cardiology, there is a minimal requirement to spend 12 months in an acute cardiac care unit. Thereafter (or sometimes before board exam) further suggested period of training is down to the individual trainee, but most would usually spend an additional 6 months. This time is also influenced by the goal (work under supervision or duties only with on call) and character of the unit (extent of invasive procedures etc.)

- **Training centres availability. Please comment on acute cardiac care training in your country.**

Training in acute and intensive cardiac care is performed in intensive cardiac care units in cardiovascular centres (see also point 3)

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	cardiologists	dedicated acute cardiac care unit
Hypothermia	cardiologists and intensivists	dedicated acute cardiac care unit , other ICU (i.e. medical, multidisciplinary)
Mechanical ventilation	cardiologists and intensivists	dedicated acute cardiac care unit , other ICU
Dialysis	Continuous: cardiologists and intensivists Intermittent: nephrologists	dedicated acute cardiac care unit , other ICU
Endomyocardial biopsy	cardiologists	dedicated acute cardiac care unit
Percutaneous coronary angioplasty	cardiologists	dedicated acute cardiac care unit
ECMO/ECLS	cardiologists (predominantly VA ECMO) and intensivists	dedicated acute cardiac care unit, other ICU
Non invasive ventilation	cardiologists, intensivists	dedicated acute cardiac care unit , other ICU
Insertion and monitoring of an arterial lines	cardiologists and intensivists	dedicated acute cardiac care unit , other ICU
Insertion and monitoring of a central venous catheter	cardiologists and intensivists	dedicated acute cardiac care unit, other ICU
Insertion and monitoring of a pulmonary artery catheter	cardiologists and intensivists	dedicated acute cardiac care unit, other ICU
Pericardiocentesis	cardiologists	dedicated acute cardiac care unit
Transvenous temporary pacing	cardiologists (much less intensivists)	dedicated acute cardiac care unit (other ICU)
Echocardiography transesophagial	cardiologists	dedicated acute cardiac care unit
Direct current cardioversion	cardiologists and intensivists	dedicated acute cardiac care unit (other ICU), lounge
Echocardiograhy transthoracic	1.cardiologists 2.intensivists	1. dedicated acute cardiac care unit 2. other ICU

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	6700 pts/year (data extrapolation from CZECH-2 registry)	cardiologists	dedicated acute cardiac care unit – initially
NSTEMI	11600 pts/year (data extrapolation from CZECH-2 registry)	cardiologists (internists-intensivists)	dedicated acute cardiac care unit or general medical unit (in non PCI centres)
Sudden cardiac death	5000 pts/year (estimate based on data from one region)	cardiologists and intensivists	dedicated acute cardiac care unit general mixed medical/surgical unit general medical unit
Pericarditis non complicated	NA	cardiologists and internists	dedicated acute cardiac care unit general medical unit
Cardiogenic shock	NA	cardiologists	dedicated acute cardiac care unit
Cardiac tamponade	NA	cardiologists	dedicated acute cardiac care unit
Type A aortic dissection	140 pts/year	cardiac surgeons, cardiologist	ICU at Cardiac surgery Dept dedicated acute cardiac care unit (preop)
Conduction disturbances with syncope	NA	cardiologists internists-intensivists	dedicated acute cardiac care unit general mixed medical/surgical unit general medical unit
Pulmonary edema	1200-1500 pts/year (estimate based on data from AHEAD registry)	cardiologists and internists-intensivists	dedicated acute cardiac care unit general medical unit general mixed medical/surgical unit
Non-complicated type B dissection	NA	cardiologists and internists-intensivists	dedicated acute cardiac care unit general medical unit

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **Yes** mostly in academic hospitals Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals	Common in country **Yes** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

In Cardiovascular centres (for adults 11 "complecardiovascular" centres and 6 cardiovascular centres in the country) there are usually dedicated acute cardiac care/intensive cardiac care units. The head of this unit is a cardiologist. In some academic centres, the head of ICCU is a cardiologist with national certification in intensive care.
In regional hospitals without the status of cardiovascular centres, there are usually general medical units (basic and midlevel) and general mixed medical/surgical units or units being part of Anaesthesiology Dept., where invasive mechanical ventilation is possible.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	x				
Low awareness of guidelines	2		x			
Lack of operators	2		x			
Lack of reimbursement,	2		X			
Lack of referral	2		x			
Limited financial resources	3			x		
Lack of trained personnel	3			x		

DENMARK

Demographic and socioeconomic context

Population (x1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
5609	17.7	19.1	87	44 863

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
29	19.3	20.0	9.3	583.1	135.9

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
…	15.2	10.6	15.9	12.8

*per 100 000 population

Human resources for health services

Physician*	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses*	Physician Graduates*	Nurses Graduates*
362	48	34	…	63	1631	18	92

*per 100 000 population

1. Name of National Cardiac Society

Dansk Cardiologisk Selskab; DCS (in English: Danish Society of Cardiology)

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Working group on Acute Cardiac Care

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

The prehospital sector is mainly covered by ambulances without doctors, but for more severe cases both helicopters and prehospital specialist doctors can be transported to the location. All areas of Denmark are covered by a STEMI network including tele-ECG service from ambulances to the nearest Heart Centre. All patients with STEMI are rapidly transported to the nearest Heart Centre for primary PCI by ambulance or helicopter. Other acute severe heart conditions are also discussed immediately between the prehospital personnel and the Heart Centres through the STEMI network, but there are No specific 'Acute Heart Failure networks'.

- **In hospitals**

The National Board of Health decides which type of patients (diagnosis) that can be admitted to a given hospital, and what kind of treatment a given hospital can give. Only 4 university hospitals are allowed to offer primary PCI. Acute heart failure patients and NSTEMI/chest pain patients can be admitted to all hospitals that can handle acute patients.

4. How hospitals are reimbursed for acute cardiac care patients

Per patient reimbursement. A system of flat rate packages built from pre-established lists of pathologies, technical interventions and some comorbidity. The so-called DRG system.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement nor incentive

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	**X**		Dansk Hjerteregister
Acute heart failure		**X**	Not yet ready
Cardiac arrest	**X**		Dansk Hjertestopregister

- **Availability of a national quality insurance system or complication registry**

Yes as part of 'Dansk Hjerteregister'

6. Guidelines

Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **Yes**
U.S. **No**
European **No**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No

For allied professionals?

No

For training centres?

No

- **National Cardiac Society supporting ACCA certification system**
  Yes, the Society advises ACCA certification, but it does not promote national certification

- **Official national competency guidelines for acute cardiac care organisation?**
  No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**
  No specific training

- **Training centres availability. Please comment on acute cardiac care training in your country.**

We do not have a specific program for Acute Cardiac training. It is part of the general training as a cardiologist. This takes (after medical school) at least 7 years.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP		
Hypothermia	1. Intensivists 2. Cardiologist	ICU
Mechanical ventilation	Intensivist	ICU
Dialysis	1. Nephrologist 2. Intensivists	Anywhere
Endomyocardial biopsy	cardiologist	Cath lab
Percutaneous coronary angioplasty	cardiologist	Cath lab
ECMO/ECLS	1) Intensivist 2) Cardiologists (rare, but arising)	Cath lab + ICU
Non invasive ventilation	1) Intensivists 2) Cardiologist	ICU
Insertion and monitoring of an arterial lines	Intensivists	ICU
Insertion and monitoring of a central venous catheter	Intensivists	ICU, CCU or a normal ward
Insertion and monitoring of a pulmonary artery catheter	Intensivists	ICU
Pericardiocentesis	Cardiologists	Echolab and at any ward

Transvenous temporary pacing	cardiologists	Done in the cath lab The patient can be on any ward
Echocardiography transesophagial	1. Cardiologists 2. Intensivists	Echolab or at a normal ward ICU og operating theater
Direct current cardioversion	Joint venture between cardiologist and Intensivists	Anywhere
Echocardiograhy transthoracic	Cardiologists or technicians	Echolab, anywhere

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	3000	Cardiologist	Cath lab, CCU, Tertiary hospitals
NSTEMI	10000	Cardiologist	Cath lab, CCU, Tertiary hospitals
Sudden cardiac death	3500	1. Intensivists 2. Cardiologist	ICU, any hospital (in some regions centralized to Tertiary hospitals)
Pericarditis non complicated	NA	General internal medicine and Cardiologist	General ward, anywhere
Cardiogenic shock	150	Cardiologists and Intensivists together	Cath lab, ICU, Tertiary hospitals
Cardiac tamponade	NA	Cardiologists	Echolab, ICU, Tertiary hospitals
Type A aortic dissection	NA	Cardiologist for diagnosis; Cardiac surgeons for treatment	ICU, Tertiary hospitals
Conduction disturbances with syncope	NA	Cardiologists	General cardiac ward, anywhere Treated with PM at secondary hospitals
Pulmonary edema	NA	General internal medicine and Cardiologist	anywhere
Non-complicated type B dissection	NA	Cardiologists	CCU, Tertiary hospitals

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**x	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**

LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**

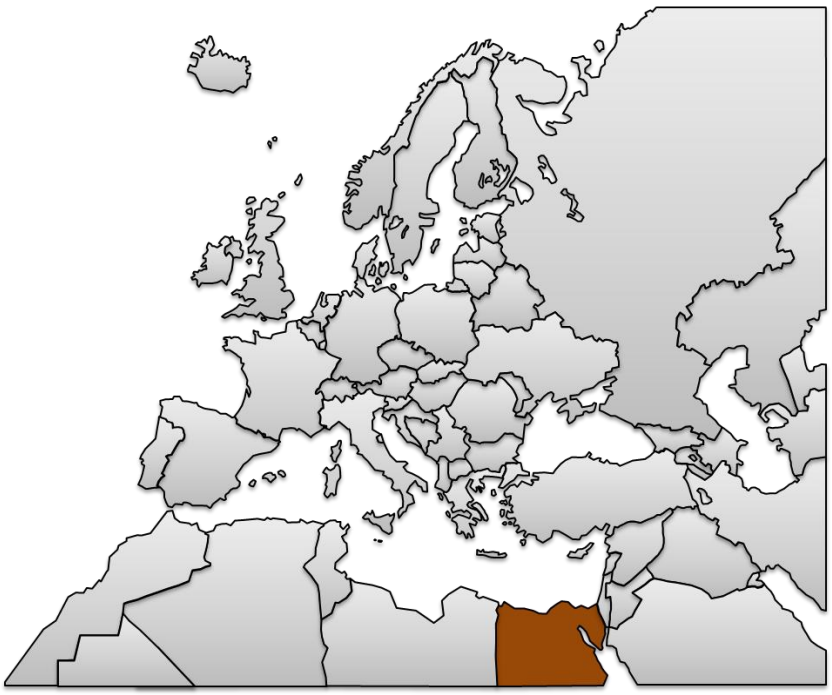
11. Sites and units that manage patients who need acute cardiac care

All patients (except STEMI, cardiogenic shock, cardiac arrest etc) goe through the 'same door' to an acute ward for a few hours. A specialist in acute medicine, in internal medicine or a cardiologist (or a fellow) then decides which ward the patient goes to. The speciality of this doctor varies throughout the country.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres		x				
Lack of reimbursement,		x				
Limited financial resources		x				
Lack of referral		x				
Lack of trained personnel			x			
Low awareness of guidelines			x			
Lack of operators			x			

EGYPT



Demographic and socioeconomic context

Population (x1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*

*per 100 000 population

1. Name of National Cardiac Society

Egyptian Society of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

EgIC Egyptian Working Group of Interventional Cardiology

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Patients are mostly referred by families 70%; EMS service 30%.
EMS is available, but No prehospital management in ambulance. Since there is most of the time No organised telecommunication, No specific medication is given in the ambulance. They are just carrier.
Patients may go to private clinics where they are diagnosed and referred to hospitals

- **In hospitals**

Egypt has 92 million inhabitants. Of these, 18 million live in greater Cairo. There is a rising number of CAD and heart attacks affecting all ages. Risk factors especially smoking (in 60 % of ACS patients) are highly prevalent in the population.
There is an increase in the number of cardiac centres, governmental and private. Each governorate has at least one tertiary centre. Cairo has the National Heart Institute that receives 200 acute cases daily, including 20 STEMI. It has also 4 university hospitals, 4-5 moderate to large ministry of health hospitals and military hospitals. Their number is still too low especially in big cities like Cairo especially for ICU beds. For ACS, only 10% of patients reach a facility where primary PCI is available.

4. How hospitals are reimbursed for acute cardiac care patients

60% of patients have full reimbursement from the government ministry of health, 20% governmental insurance, 20% private or companies

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

  For governmental hospitals physicians receive a fixed salary from government.
  For others, they are paid by the insurance, in private hospitals.
  Non-invasive treatment including thrombolysis is available in most hospitals, intervention is available in the first few hours only for 10% of STEMI.

Physicians

Physician does not receive reimbursement or incentive

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

  Restricted to certain number of treatments/budget per year

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	**Yes**		Stent for life COMBATMI
Acute heart failure		**No**	
Cardiac arrest		**No**	

- **Availability of a national quality insurance system or complication registry**
  *__Yes__

Not universal, only available for big hospitals

6. Guidelines

Discussed in lectures but not exactly implemented

National Cardiac Society	**Yes**
U.S.	**No**
European	**No**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

Yes, but it´s not required for practice

As part of cardiology training, National Heart Institute, University centres, Egyptian Fellowship Board of Cardiology, training during the residency program as we have cardiology residents(majority) and intensive care residents, residence program is 4 years in different Health Ministry hospitals and University hospitals, during these years they are exposed to all acute cardiac cases in the ER and ICU/ CCU including all ACS, acute heart failure, arrhythmias, pulmonary embolism, aortic dissection. ICU/ CCU procedures, CPR, ventilator management cardiologists , Intensive care, cardiac surgeons in tertiary hospitals

For allied professionals?

Yes, but it´s not required for practice and not specifically cardiac

Official name: Cardiology Master and Doctorate, Intensive care and Critical Care master and Doctorate, Egyptian Society of Cardiology (EgIC)

For training centres?

Yes, but it´s not required for practice

- **National Cardiac Society supporting ACCA certification system**
  No
- **Official national competency guidelines for acute cardiac care organisation?**
  No
- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**
  6 Months
- **Training centres availability. Please comment on acute cardiac care training in your country.**

As part of cardiology training (Egyptian Fellowship Board of Cardiology) in the National Heart Institute or University centres during the residency program with a majority of cardiology residents and some intensive care residents. Residency program last for 4 years in different Health Ministry hospitals and University hospitals.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologists, cardiac surgeon, intensivists	Tertiary centres in CCU/ ICU
Hypothermia	None	
Mechanical ventilation	Intensivists, cardiologists, anaesthesia	Most CCU/ ICU
Dialysis	Nephrologists	Dialysis centres, mobile dialysis in moderate to big centres CCU/ ICU
Endomyocardial biopsy	none	
Percutaneous coronary angioplasty	Cardiologists	All hospitals with catheter lab, moderate to big centres
ECMO/ECLS	Intensivists, rare	Few tertiary centres
Non invasive ventilation	Intensivists, anaesthesia	Moderate and big centres
Insertion and monitoring of an arterial lines	Cardiologists, intensivists, anaesthesia, cardiac surgeon	Moderate to big centres
Insertion and monitoring of a central venous catheter	Cardiologists, intensivists, anaesthesia, cardiac surgeon	All CCU/ ICU
Insertion and monitoring of a pulmonary artery catheter	Intensivists, cardiac surgeons, rare	Few tertiary centres
Pericardiocentesis	Cardiologists	Cath lab, CCU/ ICU
Transvenous temporary pacing	Cardiologists	Cath lab, CCU/ ICU
Echocardiography transesophagial	Cardiologists	Echo lab, Cath lab, CCU/ ICU
Direct current cardioversion	Cardiologists	CCU/ ICU, ward, cath lab
Echocardiograhy transthoracic	Cardiologists	Echo lab, bed side CCU/ ICU

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	150.000	Cardiologists Internists intensivists	ICU/ CCU in 60% 30% not diagnosed or referred 10% 1ry PCI in Moderate to big centres with Cath lab,
NSTEMI	150.000	Cardiologists, Internists, intensivists	ICU/ CCU, Cath lab,
Sudden cardiac death	Number NA	Cardiologists intensivists	ER, ICU, CCU
Pericarditis non complicated	Number NA	Cardiologists	ICU/ CCU/ ward
Cardiogenic shock	10% of MI	cardiologists	ICU/ CCU, Cath lab
Cardiac tamponade	NA	cardiologists	ICU/ CCU, Cath lab
Type A aortic dissection	Number NA	Cardiologists Cardiac surgeon	ICU/ CCU, cardiac surgery
Conduction disturbances with syncope	Number NA	cardiologists	ICU/ CCU
Pulmonary edema	NA but > 200.000	Cardiologists, Internists intensivists	ICU/ CCU
Non-complicated type B dissection	Number NA	Cardiologists Cardiac surgeon	ICU/ CCU, cardiac surgery

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	Dedicated Acute cardiac care unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

Acute cardiac conditions are taken to ER and admitted to ICU/ CCU if in need of admission and if there are available beds. Otherwise the patient's relatives have to follow a hotline to find a bed in big cities.
Mainly treated by cardiologist 70%. Almost 3000 cardiologists in Egypt and around one third are involved in acute cardiac care.
Some patients, around 20-30% are treated by intensivists or internists
Cardiac centres have three levels of expertise.
Basic in territories. Usually there is a small 4-6 beds ICU that manages simple cases and refers others (less than 10%) and usually after first 24 hours
Mid-level centres: larger ICU/CCU with trained cardiologists. Urgent PCI is increasingly available.
Tertiary centres like the National Heart Institute (60 CCU beds) and university hospitals have advanced care (ie primary PCI) but the number of beds is not enough. The NHI(National Heart Institute) and its satellite centres are the biggest tertiary cardiac centre with almost 400 beds of cardiology and cardiac surgery and it provides almost free service, it is a teaching hospital, it is the home for Egyptian Fellowship Board of Cardiology. Most cardiologists who are in ministry of health seek training at NHI

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	X				
Limited financial resources	2		X			
Lack of trained personnel	3			X		
Low awareness of guidelines	4				X	
Lack of reimbursement,	5					
Lack of referral	5					X
Lack of operators	5					X

ESTONIA

Demographic and socioeconomic context

Population (x1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
1318	17.1	18.0	69	26 355

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
31	22.6	31.7	11.4	759.7	369.2

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
4.1	17.7	5.7	11.7	18.9

*per 100 000 population

Human resources for health services

Physician*	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
328	74	44	79	99	617	11	36

*per 100 000 population

1. Name of National Cardiac Society

Estonian Society Of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

WG of acute coronary syndromes at Estonian Society of Cardiology

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Call to central emergency service activates an ambulance, patient will then be handled according to algorithms, including choice of hospital according to pathology suspected.

- **In hospitals**

Mostly patients are taken to the nearest hospital, except patients with STEMI or/and hemodynamic instability. For these patients the nearest STEMI network hospital is recommended as the primary choice with subsequent transfer to a tertiary care hospital with ICCU and cardiac surgery (one in Tallinn and one in Tartu) if not primarily hospitalised there.

4. How hospitals are reimbursed for acute cardiac care patients

Hospitals are reimbursed via Estonian Health Insurance Fund payments according to the service provided. Payments are restricted to certain listed services, with DRG methodology applied in a certain proportion of payments.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians
Physician does not receive reimbursement or incentive
Hospitals
Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No up front restrictions apply as we treat all patients according to need. However some admissions may not be reimbursed if the available budget has already been used for a particular time period. So we are restricted to a certain number of treatments/budget per year.

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		Myocardial Infarction Registry
Acute heart failure		X	
Cardiac arrest		X	

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **Yes**
U.S. **No**
European **Yes**, with national specific recommendations

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

Yes

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Suggested

- **Comment on acute cardiac care training in Estonia**

Available training in North Estonia Medical Centre and Tartu University Hospital

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	cardiologist	ICCU
Hypothermia	cardiologist	ICCU
Mechanical ventilation	cardiologist	ICCU
Dialysis	Nephrologist/Intensivist	ICCU/nephrology or ICU
Endomyocardial biopsy	Cardiologist	Angio lab
Percutaneous coronary angioplasty	Cardiologist	Angio lab
ECMO/ECLS	Intensivist	ICU
Non invasive ventilation	Cardiologist Emergency medicine physician	ICCU ICU of Emergency department
Insertion and monitoring of an arterial lines	Cardiologist Emergency medicine physician	ICCU ICU of Emergency department
Insertion and monitoring of a central venous catheter	Cardiologist Emergency medicine physician	ICCU ICU of Emergency department
Insertion and monitoring of a pulmonary artery catheter	Cardiologist	ICCU
Pericardiocentesis	Cardiologist	ICCU

Transvenous temporary pacing	Cardiologist	ICCU
Echocardiography transesophagial	Cardiologist	ICCU
Direct current cardioversion	Cardiologist	ICCU
Echocardiograhy transthoracic	Cardiologist	ICCU

ICCU – intensive cardiac care unit (highest level in our country)
ICU – intensive care unit

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated		Cardiologist (Intensivist)	ICCU in tertiary care and ICU in secondary care
NSTEMI		Cardiologist (in nearest hospital intensivist or internal medicine physician)	ICCU or intermediate care ICU
Sudden cardiac death		Cardiologist (in nearest hospital intensivist)	ICCU or in nearest hospital ICU, then transferred to ICCU
Pericarditis non complicated		Cardiologist	Cardiology or internal medicine
Cardiogenic shock		Cardiologist	ICCU
Cardiac tamponade		Cardiologist	ICCU
Type A aortic dissection		Cardiologist/cardiovascular surgeon)	ICCU
Conduction disturbances with syncope		Cardiologist (in nearest hospital intensivist or internal medicine physician)	ICCU or in nearest hospital ICU, then transferred
Pulmonary edema		Cardiologist (in nearest hospital intensivist or internal medicine physician)	ICCU or in nearest hospital ICU, then transferred
Non-complicated type B dissection		Cardiologist/cardiovascular surgeon	ICCU or department of vascular/cardiac surgery

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

Tertiary care hospitals with ICCU, cardiac surgery and 24/7 PCI

1. North Estonia Medical Centre, Tallinn
2. Tartu University Hospital, Tartu

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	x				
Lack of reimbursement,	2		x			
Lack of referral	2		x			
Low awareness of guidelines	2		x			
Lack of operators	2		x			
Limited financial resources	3			x		
Lack of trained personnel	3			x		

FRANCE

Demographic and socioeconomic context

Population (x1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
63794	17.1	21.8	85	38 851

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
36	23.9	21.0	8.5	484.6	107.2

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
4.3	21.4	11.7	15.8	7.4

*per 100 000 population

Human resources for health services

Physician*	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
319	44	46	160	85	967	9	40

*per 100 000 population

1. Name of National Cardiac Society

Société Française de cardiologie

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Groupe Urgences et Soins Intensifs de Cardiologie (USIC)

3. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

Prehospital medical emergencies in France are managed by a web of call centers that are joined through a unique call number the 15 (or 112). This system is called SAMU (Service d'Aide Médicale Urgente). The call center most of the time will give advice, dispatch a GP and/or an ambulance (basic CLS). In less than 10% of cases it will dispatch a MICU (mobile intensive care units) that is staffed (by law) with a physician, a nurse and an ambulance driver. They are most of the time linked to an emergency department. The patient is then treated on site before being transferred to a hospital, most of the time the hospital where the MICU is based but also to more specific hospitals.
The system covers all the French territory with around 100 call centers and more than 600 hospitals with available MICU on standby. When first seen by a GP, they will contact the emergency central call hub or send the patient to the emergency department. Nowadays the SAMU system is able to establish direct contact with any catheterization laboratory. In most parts of the system, patients are managed using standardized referral and treatment guidelines.
Many patients with cardiac problems present directly to the emergency department. After assessment they are admitted to specific units (cardiology or other) for more specialized treatment.

- **In hospitals**

Most patients with acute cardiac pathologies will be hospitalised, but not all in a cardiology ward. Many will go to general wards, geriatric units or will stay in step down units based in the ED.
Where appropriate patients may be admitted to specific acute cardiac care units that are called "Soins intensifs de cardiologie". These units are not intensive care units but rather middle level or basic monitoring units. They are managed by cardiologists. Few of them have any intensive care facilities and they are not used to managing intra-arterial lines or central venous access. In many (even small) hospitals there is an intensive cardiac care unit that will manage patients in moderately critical or severe condition.

So typically, emergency physicians manage the patient on arrival. The patient is then transferred to a medical ward (possibly specializing in cardiology), an acute cardiac care unit (always managed by cardiologists) or an intensive care unit (always managed by intensivists) according to his/her condition.

4. How hospitals are reimbursed for acute cardiac care patients

Per patient reimbursement. A system of flat rate packages built from pre-established lists of pathologies, technical interventions and some allowance for comorbidity.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

<u>Physicians</u>

Physician does not receive reimbursement or incentive

<u>Hospitals</u>

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the ESC guidelines ·

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		Regional registries (EMUST, RESCUe, RESURCOR, RICCO)
Acute heart failure		X	none
Cardiac arrest	X		REAC (nationwide)
Infectious Endocarditis	X		Regional

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **Yes**
U.S. **No**
European **Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No

There is No national certification. There is a university diploma that is common to 5 universities (Lyon-Grenoble; Toulouse-Montpelier; Paris)

For allied professionals?

No

There are university diplomas. They are not required for practice and are more intensive care than acute cardiac care curriculum.

For training centres?

No

Acute cardiac care units ("Soins intensifs de cardiology") are certified by the health ministry. But there is No certification of their ability to train physicians in acute cardiac care.

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

Yes

There are official texts dating from 2005 that define acute cardiac care units (USIC). They are more recommendation than compulsory.

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Yes Required 6 months

- **Training centres availability. Please comment on acute cardiac care training in your country.**

There is No specific training for acute cardiac care. Nor is there any specific recognition of this activity as a subspecialty of cardiology.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologists	Intensive cardiac care units Intensive care units (heart surgery)
Hypothermia	1) Intensivists 2) Cardiologists	Intensive care units
Mechanical ventilation	1) Intensivists 2) Emergency physician 3) Cardiologists	Intensive care units
Dialysis	Intensivists	Intensive care units
Endomyocardial biopsy	Cardiologists	Cathlab
Percutaneous coronary angioplasty	Cardiologists	Cathlab
ECMO/ECLS	Intensivists	Intensive care units
Non invasive ventilation	1) Emergency physician 2) Cardiologists	Acute/intensive cardiac care units Intensive care units Step down units Emergency department
Insertion and monitoring of an arterial lines	1) Intensivists 2) Cardiologists	Intensive care units
Insertion and monitoring of a central venous catheter	1) Intensivists 2) Cardiologists	Intensive care units Acute/intensive cardiac care units
Insertion and monitoring of a pulmonary artery catheter	1) Intensivists 2) Cardiologists	Intensive care units Acute/intensive cardiac care units
Pericardiocentesis	Cardiologists	Acute/intensive cardiac care units Cathlab
Transvenous temporary pacing	Cardiologists	Cathlab Acute/intensive cardiac care units
Echocardiography transesophagial	Cardiologists; Intensivists	Acute/intensive cardiac care units
Direct current cardioversion	Cardiologists; intensivists Emergency physician	Everywhere
Echocardiograhy transthoracic	Cardiologists; Intensivists Emergency physicians	Emergency department Acute/intensive cardiac care units Intensive care units

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated		Cardiologists	Acute/intensive cardiac care units
NSTEMI		Cardiologists	Acute/intensive cardiac care units Stepdown units
Sudden cardiac death		Intensivists	Intensive care units
Pericarditis non complicated		Emergency physician Cardiologists	Emergency department Acute/intensive cardiac care units
Cardiogenic shock		Intensivists	Intensive care units
Cardiac tamponade		Cardiologists Cardiac surgeon Intensivists	Acute/intensive cardiac care units Intensive care units

Type A aortic dissection		Intensivists	Intensive care units
Conduction disturbances with syncope		Cardiologists	Acute/intensive cardiac care units
Pulmonary edema		Emergency physician Cardiologists	Emergency department Acute/intensive cardiac care units Intensive care units
Non-complicated type B dissection		Cardiologists	Acute/intensive cardiac care units

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

There is a large heterogeneity in units that are currently managing acute cardiac care patients. Most patients will be managed initially by emergency physicians who will then direct the patient appropriately.

They may keep the patient in an ED based monitoring unit (level B or M),or may transfer the patient to an acute cardiac care unit (most of the time level B or M and in some rare tertiary hospitals level I). These units are managed by cardiologists.

Most patients who require prolonged (invasive or non invasive) ventilation will be managed by intensivists or emergency physicians and rarely by cardiologists.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	x				
Limited financial resources	2		x			
Lack of referral	2		x			
Lack of trained personnel	2		x			
Low awareness of guidelines	2		x			
Lack of reimbursement,	3			x		
Lack of operators	3			x		

IRELAND

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
4593	11.1	19.5	62	47 804

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
…	25.6	18.1	6.1	554.0	181.5

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
2.1	14.1	8.9	14.1	16.8

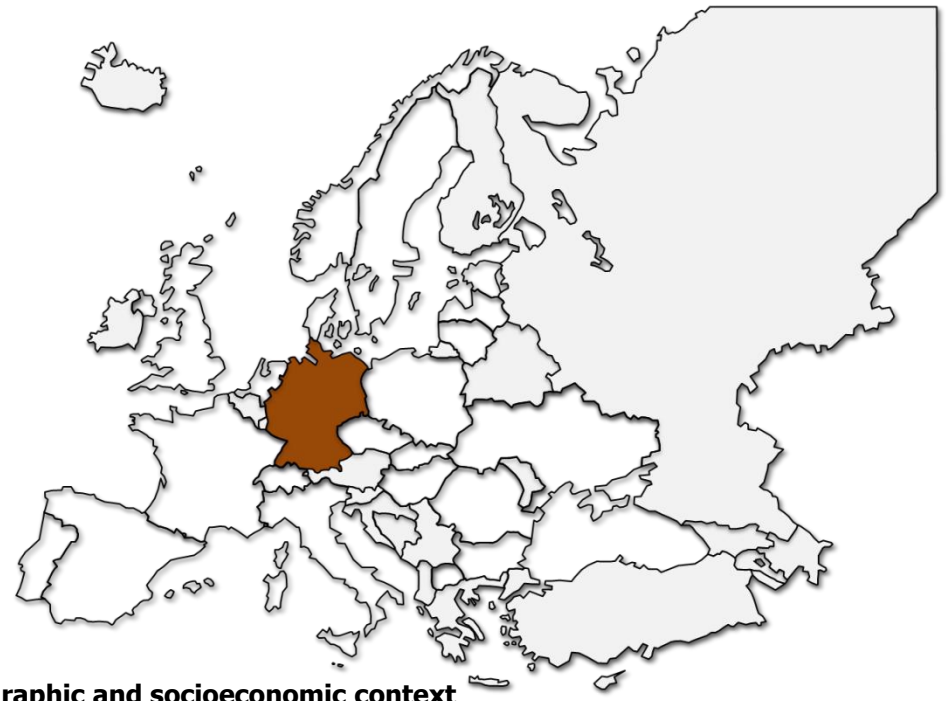
*per 100 000 population

Human resources for health services

Physician*	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
269	43	22	73	66	1237	20	33

*per 100 000 population

GERMANY



Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
80646	20.8	19.5	74	45 616

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
30	20.1	19.5	11.1	563.9	199.8

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
4.0	25.2	11.3	19.4	12.9

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
405	45	42	67	94	1296	12	55

*per 100 000 population

1. Name of National Cardiac Society

Deutsche Gesellschaft für Kardiologie (DGK), German Cardiac Society

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Working Group on intensive and emergency cardiac care.

3. Please, describe how your Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Ambulances are equipped with emergency physicans. In case of a emergency call related to chest pain or acute dyspnea such an ambulance will go to the patient. Most regions will have STEMI networks.

- **In hospitals**

Depends on the hospital setting. A lot of hospitals have chest pain units, most emergency departments. Patients with STEMI will be admitted directly to cath-labs.

4. Please describe how hospitals are reimbursed for acute cardiac care patients

DRG system.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement neither incentive

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the National guidelines ·

5. National or large regional registries

Registries relevant to acute cardiac care	yes	no	Name
Acute coronary syndromes	x		
Acute heart failure		x	
Cardiac arrest	x		

- **Availability of a national quality insurance system or complication registry**

Yes

Only for patients undergoing coronary angiography and/or PCI.

6. Guidelines

Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**Yes**
U.S.	**No**
European	**Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No

For allied professionals?

No

For training centres?

No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

No, except for chest pain units: CPU guidelines.

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Suggested and 12 Months

- **Training centres availability. Please comment on acute cardiac care training in your country.**

No comment

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*
IABP	Interventional cardiologist, cardiac surgeon
Hypothermia	Internist
Mechanical ventilation	Internist
Dialysis	Nephrologist
Endomyocardial biopsy	Interventional cardiologist
Percutaneous coronary angioplasty	Interventional cardiologist
ECMO/ECLS	Interventional cardiologist
Non invasive ventilation	Internist
Insertion and monitoring of an arterial lines	Internist
Insertion and monitoring of a central venous catheter	Internist
Insertion and monitoring of a pulmonary artery catheter	Internist
Pericardiocentesis	Interventional cardiologist

Transvenous temporary pacing	Internist
Echocardiography transesophagial	Cardiologist
Direct current cardioversion	Cardiologist
Echocardiograhy transthoracic	Cardiologist

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	50.000	Cardiologist	Acute/intensive cardiac care units
NSTEMI	150.000	Cardiologist, Internist	Acute/intensive cardiac care units Stepdown units
Sudden cardiac death	?	Intensivist	Intensive care units
Pericarditis non complicated	?	Emergency Physician Cardiologist	Emergency department Acute/intensive cardiac care units
Cardiogenic shock	10.000	Intensivist	Intensive care units
Cardiac tamponade	?	Cardiologist Intensivist	Acute/intensive cardiac care units Intensive care units
Type A aortic dissection	?	Intensivist	Intensive care units
Conduction disturbances with syncope	?	Cardiologist	Acute/intensive cardiac care units
Pulmonary edema	?	Cardiologist Emergency Physician Intensivist	Emergency department Acute/intensive cardiac care units Intensive care units
Non-complicated type B dissection	?	Cardiologist	Acute/intensive cardiac care units

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL I capabilities # Non-invasive and ALL invasive	Common in country **No**	Common in country **Yes**	Common in country **No**	Common in country **Yes**

monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Mostly in academic hospitals **No**	Mostly in academic hospitals **No**

11. Sites and units that manage patients who need acute cardiac care

No comment

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	x				
Limited financial resources	2		x			
Lack of referral	1	x				
Lack of trained personnel	1	x				
Low awareness of guidelines	1	x				
Lack of reimbursement,	2		x			
Lack of operators	1	x				

GREECE

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
11093	19.9	19.8	61	26 099

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
40	22.9	18.4	10.5	553.1	217.6

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
2.8	19.6	9.8	11.7	26.4

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
619	41	…	31	192	355	14	…

*per 100 000 population

HUNGARY

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life expectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
9893	17.4	16.8	68	24 498

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
31	24.0	28.6	12.8	840.7	387.1

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health expenditure as % of GDP	Government expenditure on health as % of total government expenditure	Private households' out-of-pocket expenditure as % of total health expenditure
1.7	20.2	8.1	10.2	27.5

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
321	55	40	…	78	643	15	34

*per 100 000 population

1. Name of National Cardiac Society

Hungarian Society of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

WG of HSC on Resuscitation and Intensive Care

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

: In the prehospital setting the acute cardiac care is done by the EMS system. They have standardized protocols for chest pain, dyspnea, acute heart failure and cardiogenic shock, sudden cardiac death management, RSI airway support, invasive and non-invasive mechanical ventilation.

- **In hospitals**

The tertiary and university centers follow the ESC guidelines to treat the acute pathologies as well as the chronic ones. All the ESC guidelines are endorsed and most of them are translated to national language to spread them to the "lower-level" hospitals.

4. How hospitals are reimbursed for acute cardiac care patients

& The Hungarian healthcare fund reimburses the emergency treatment of acute cardiac diseases. Reimbursement is done on a case by case basis. The DRG payment is based on the most serious cardiac disease to be treated in the emergency situation, referring to the guidelines.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physicians do not receive reimbursement or incentive

Hospitals

Hospitals do not receive reimbursement, but incentives (e.g. more budget on the following year)

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the National guidelines ?
Hospitals are restricted to a limited number of treatments/budget per year, and thisVolume Limit is determined by the National Health Fund

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		STEMI Register
Acute heart failure	X		HF Register including CHF patients
Cardiac arrest	X		Website is established already. Till end of 2015 it is not yet available, application started for budget, pending.

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**All centers**
U.S.	**University and Educational Centers, but mainstream is ESC GLs**
European	**Most Centers**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
Not yet, only Emergency Care
For allied professionals?
No
For training centres?
No, but in the planning stage

- **National Cardiac Society supporting ACCA certification system**

Yes the Society advises ACCA certification, but it does not require it

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

No specific training

- **Training centres availability. Please comment on acute cardiac care training in your country.**

None

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

No specific training

- **Training centres availability. Please comment on acute cardiac care training in your country.**

Training only availablein University Centers, but the Curriculum is a part of the Emergency Care Curriculum, not the Cardiology Specialisation Curriculum, as yet. Training Center application is planned later in 2016 , for Semmelweis University Heart and Vascular Centre.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	1, Cardiologist, 2,Cardiac Surgeon, 3, Intensivist	1. CathLab 2. Cardiovascular OR 3. CCU 4. CVS-ICU (Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists)
Hypothermia	1., Intensivist 2, Cardiologist, 3,Cardiac Surgeon	1 ICU 2 (A)CCU 3 CV-OR (General Medical unit Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists)
Mechanical ventilation	1., Intensivist 2, Cardiologist,	1 ICU 2 (A)CCU Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists
Dialysis	1., Intensivist 2, Cardiologist,	1 ICU 2 (A)CCU Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists
Endomyocardial biopsy	1., Cardiologist, 2, Intensivist 3,Cardiac Surgeon	1 (A)CCU 2 ICU 3 CV-OR Dedicated Acute cardiac care unit managed mainly by cardiologists
Percutaneous coronary angioplasty	Cardiologist	1 (A)CCU 2 ICU 3 CV-OR Dedicated Acute cardiac care unit managed mainly by cardiologists
ECMO/ECLS	1., Cardiologist+ Intensivist+ Cardiac Surgeon	CVS-ICU Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists
Non invasive ventilation	1., Cardiologist, 2, Intensivist	1 (A)CCU 2 ICU Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists
Insertion and monitoring of an arterial lines	1., Intensivist 2, Cardiologist,	1 ICU 2 (A)CCU Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by

		cardiologists
Insertion and monitoring of a central venous catheter	1., Intensivist 2, Cardiologist,	1 ICU 2 (A)CCU Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists
Insertion and monitoring of a pulmonary artery catheter	1., Intensivist and Cardiologist (equal)	1 ICU 2 (A)CCU Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists
Pericardiocentesis	1., Cardiologist, 2, Intensivist	1 (A)CCU 2 ICU Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists
Transvenous temporary pacing	1., Cardiologist and Intensivist	1 (A)CCU, ICU, CathLab, EP Lab Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists
Echocardiography transesophagial	1., Cardiologist, 2, Intensivist	(A)CCU CVS-ICU Cardiovascular OR CathLab Dedicated Acute cardiac care unit managed mainly by cardiologists
Direct current cardioversion	1., Cardiologist and Intensivist (equal)	(A)CCU CVS-ICU Cardiovascular OR CathLab
Echocardiograhy transthoracic	1., Cardiologist	(A)CCU CVS-ICU Cardiovascular OR CathLab General Mixed Medical/Surgical unit General Medical unit Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists

9. Managements of some common pathologies in acute cardiac care

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	7000	1. Cardiologist, 2, Intensivist	1, Dedicated Acute cardiac care unit managed mainly by cardiologists 2, Dedicated Acute cardiac care unit managed mainly by non cardiologists
NSTEMI	4500	1. Cardiologist, 2, Intensivist	General Medical unit Dedicated Acute cardiac care unit managed mainly by non cardiologists Dedicated Acute cardiac care unit managed mainly by cardiologists
Sudden cardiac death	5000	1. Cardiologist, 2, Intensivist 3, Cardiac Surgeon if ECMO/ECLS is needed	1, Dedicated Acute cardiac care unit managed mainly by cardiologists 2, Dedicated Acute cardiac care unit managed mainly by non cardiologists 3, General Medical unit
Pericarditis non complicated	NA	1. Cardiologist, 2,Intensivist	1,Dedicated Acute cardiac care unit managed mainly by cardiologists 2, Dedicated Acute cardiac care unit managed mainly by non cardiologists 3, General Medical unit
Cardiogenic shock	500	1. Cardiologist, 2, Intensivist	1, Dedicated Acute cardiac care unit managed mainly by cardiologists 2, Dedicated Acute cardiac care unit managed mainly by non cardiologists
Cardiac tamponade	NA	1, Cardiologist, 2, Intensivist 3, Cardiac Surgeon	1, Dedicated Acute cardiac care unit managed mainly by non cardiologists + Cardiac surgical OR and ICU background 1, Dedicated Acute cardiac care unit managed mainly by cardiologists +/- Cardiac surgical OR and ICU background (equal)
Type A aortic dissection	50	1, Intensivist 1, Cardiac Surgeon	1, Dedicated Acute cardiac care unit managed mainly by non cardiologists + Cardiac surgical OR and ICU background
Conduction disturbances with syncope	6000	1. Cardiologist, 2, Intensivist	1,Dedicated Acute cardiac care unit managed mainly by cardiologists 2, Dedicated Acute cardiac care unit managed mainly by non cardiologists 3, General Medical unit
Pulmonary edema	1500	1., Cardiologist, 2, Intensivist	1,Dedicated Acute cardiac care unit managed mainly by cardiologists 2, Dedicated Acute cardiac care unit managed mainly by non cardiologists 3, General Medical unit
Non-complicated type B dissection	200	1, Cardiologist, 1, Intensivist 2, Vascular Surgeon	1,Dedicated Acute cardiac care unit managed mainly by cardiologists 2, Dedicated Acute cardiac care unit managed mainly by non cardiologists 3, General Medical unit 3, Surgical iCU

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients **Yes, temporarily** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes, temporarily** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes, temporarily** Managed mostly by intensivists **No**	Common in country **Yes** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

In Hungary it is common for acute cardiac care (ACC) patients to be treated initially by the Emergency Medical Ambulance Service. They do the initial differential diagnosis using physical examination and ECG and determine where to dispatch the patient. ACC patients are referred to a PCI Center if ACS (STE and Non STE-ACS) is suspected. Due to the limited number of PCI Centers, only the STEMI and more high risk NSTEMI patients are admitted to them, and if capacity allows, all the remaining patients with NSTE-ACS are transported to Centers which have CICU level M/I and Catheter Laboratory on site. If there is No capacity, patients are transported to the local ER or medical mid-level dependency units or ICUs. Pulmonary edema patients are treated in ERs, medical mid-dependency units (Level B or M), medical ICUs or CCUs (Level M or I), depending on the severity of the patient's condition, and the need for non-invasive or invasive mechanical ventilation.

Patients with Failed Sudden cardiac death or Cardiogenic shock are referred immediately to PCI centers in the capital, but elsewhere in the country these patients are admitted to medical ERs or ICUs (level M or I)primarily, and these units do the first differential diagnosis on the aetiology. If a cardiac cause is detected, then patients are referred on to CCUs/CICUs (level I).

Non complicated pericarditis and myocarditis, non-complicated type B dissection are treated in general medical ICUs or CCUs level M or B. If cardiac tamponade develops, patients are referred to CCUs level I with cardiac surgery back up.

Type A aortic dissection patients are transported to Level I medical or CV surgical ICUs (Level I also) and referred to cardiac surgery units.

Syncope patients are managed by level B medical mid dependency units or by neurological units. If conduction disturbances are detected as the cause of syncope patients are referred to CCUs and EP Labs.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of trained personnel	1	X				
Lack of referral	2		X			
Lack of centres	3			X		
Lack of reimbursement,	3			X		
Lack of operators	3			X		
Low awareness of guidelines	3			X		
Limited financial resources	4				X	

The main obstacle is the lack of reimbursement and capacity of the cardiac centres. Only the PCI-centers are well reimbursed but all the centers without Catheter Laboratories are underfunded, therefore the willingness of opening a non-PCI (A)CCU in a regional centre is low. ER and ICUs and Level B CCUs remain the main admitting centers of the non-complicated, non-interventional cardiac diseases

Awareness of the latest guidelines is high because the Hungarian Society of Cardiology actively promotes them nationwide and translates them into Hungarian (even though all the physicians speak English).

ISRAEL

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
8060	10.3	20.5	92	33 072

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
26	25.3	17.7	5.3	489.2	111.8

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
1.2	16.4	7.2	10.6	26.4

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
325	41	50	60	85	482	4	16

*per 100 000 population

1. Name of National Cardiac Society

Israel Heart Society

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Acute Cardiac Care Working Group

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Local voluntary organization, largely supported by the government Magen David Adom (MADA) is the main player in the field of acute cardiac care in the pre-hospital setting along with several small organizations, volunteers of Atzula, for-profit SHAHAL, NATALI. For-profit organizations provide service to their members only while MADA accepts emergency calls through the national number 101 and dispatches its crews accordingly. A structured questionnaire is administered by dispatchers and if an acute cardiac condition is suspected, a specialized mobile intensive care unit equipped with medications, advanced airway management tools and 12-lead ECG defibrillators is despatched to deliver the care. Usually they consult with a centrally available cardiologist or a local intensive cardiac care unit by phone. They can send ECGs from the field to the e-mail of the ICCU to facilitate the triage of the patient. They administer medications according to structured protocols.

- **In hospitals**

Nearly every patient with an acute cardiac problem who arrives at the emergency room is seen by an emergency physician with good knowledge of acute cardiology or a cardiology senior consultant in the daytime hours and by a cardiology fellow out of normal working hours. Frequently cardiac biomarkers, chest-ray and echocardiography are performed at the very early stage of acute cardiac problems. If the situation develops in the hospitalized patient – ICCU or consultant cardiologists provide 24/7 consultation and high-risk patients are treated in the ICCU or general Intensive Care Unit. Stroke is treated more frequently nowadays in specialized stroke units while for acute severe pulmonary embolism the approach is individualized according to the availability of resources in the ICCU and in most places these patients are treated in general ICU.

4. How hospitals are reimbursed for acute cardiac care patients

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement or incentives

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		ACSIS from 2000, Biennial for two months, the next is planned in February-March 2016
Acute heart failure	X		The last and only one was performed in 2003
Cardiac arrest	X		Was performed in ACSIS 2013 but included only cardiac arrest associated with acute coronary syndromes

- **Availability of a national quality insurance system or complication registry**

Yes

The large HMOs (Clalit and Maccabi) and as well as National Ministry of Health implement quality measures and monitor them.

6. Guidelines

Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **Yes**
U.S. **Yes**
European **Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**
  No
- **Official national competency guidelines for acute cardiac care organisation?**
  No
- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**
  Yes O Required O suggested 9 Months
- **Training centres availability. Please comment on acute cardiac care training in your country.**

9 months are dedicated to the ICCU rotation in the Curriculum of cardiology specialization in Israel

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologists	Dedicated Acute Cardiac Care Units
Hypothermia	Cardiologists	Dedicated Acute Cardiac Care Units
Mechanical ventilation	Cardiologists	Dedicated Acute Cardiac Care Units
Dialysis	Consultant nephrologists	Dialysis team
Endomyocardial biopsy	Cardiologist specially trained in heart failure/interventional cardiologist	Cath lab
Percutaneous coronary angioplasty	Interventional cardiologist	Cath lab
ECMO/ECLS	Intensivist in dedicated centers (2-3 in Israel), provide mobile ECMO services to transfer to the centers for prolonged support	ER, Cath Lab, OR
Non invasive ventilation	Cardiologist	Dedicated Acute Cardiac Care Units
Insertion and monitoring of an arterial lines	Cardiologist	Dedicated Acute Cardiac Care Units
Insertion and monitoring of a central venous catheter	Cardiologist	Dedicated Acute Cardiac Care Units
Insertion and monitoring of a pulmonary artery catheter	Cardiologist	Dedicated Acute Cardiac Care Units
Pericardiocentesis	Cardiologist	Dedicated Acute Cardiac Care Units
Transvenous temporary pacing	Cardiologist	Dedicated Acute Cardiac Care Units
Echocardiography transesophagial	Cardiologist	Dedicated Acute Cardiac Care Units
Direct current cardioversion	Cardiologist	Dedicated Acute Cardiac Care Units
Echocardiograhy transthoracic	Cardiologist	Dedicated Acute Cardiac Care Units

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	3600-4000	Interventional cardiologists	Cath labs/Acute cardiac care units
NSTEMI	8000-9500	Cardiologists/interventional Cardiologists	Acute Cardiac Care Units/cath labs
Sudden cardiac death	300	Cardiologists	Acute cardiac care units
Pericarditis non complicated	1200-1500	Internists/cardiologists	Internal medicine department/cardiology wards
Cardiogenic shock	120-180	Cardiologists	Acute Cardiac Care Units/Cath Labs/Cardiac surgery in special cases
Cardiac tamponade	NA	Cardiologists	Acute cardiac care units
Type A aortic dissection	NA	Cardiology consultant diagnosis, manages until OR	Cardiac surgery
Conduction disturbances with syncope	NA	Cardiologists	Acute cardiac Care units
Pulmonary edema	NA	Internists/cardiologists	Internal medicine department/acute cardiac care units/cardiology wards
Non-complicated type B dissection	NA	Vascular/thoracic surgeons	Vascular/thoracic and cardiac surgery

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** **No** ☐ Manage acute cardiac care patients **Yes** Managed mostly by intensivists	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals	Common in country Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

During the training in cardiology every cardiologist undergoes the training in acute cardiology including hands-on on central lines, temporary pacing, diagnostic cath (rt and lt), IABP insertion. Every ICCU is staffed by cardiologists in training and consultant senior cardiologist on call. In most of the places non-invasive cardiologist is available 24/7 for urgent echocardiography. In some peripheral places, off-hours are staffed by trainees in intensive care or anesthesia but they are supervised by the senior specialized cardiology staff.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	X				
Lack of referral	1	X				
Lack of reimbursement,	2		X			
Low awareness of guidelines	2		X			
Lack of trained personnel	4				X	
Lack of operators	4				X	
Limited financial resources	5					X

ITALY

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
60234	20.7	20.7	68	34 758

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
25	21.0	19.6	10.0	481.9	159.3

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
2.0	11.7	9.1	14.0	18.0

*per 100 000 population

Human resources for health services

Physician*	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
390	40	49	75	140	614	11	23

*per 100 000 population

1. Name of National Cardiac Society

Federazione Italiana di Cardiologia (FIC; affiliated with the ESC)
Associazione Nazionale Medici Cardiologi Ospedalieri (ANMCO)
Società Italiana di Cardiologia (SIC)

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Area Emergenza-Urgenza (ANMCO)

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Local networks for STEMI only, in the vast majority of areas (urban and non-urban)

- **In hospitals**

Coronary care units in the vast majority of hospitals with cardiology services. General intensive care for few hopsitals

4. How hospitals are reimbursed for acute cardiac care patients

Per patient reimbursement. A system of flat rate packages built from pre-established lists of pathologies, technical interventions and some comorbidity included.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement or incentive

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

Restricted to certain number of treatments/budget per year

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		EYesHOT (national)
Acute heart failure	X		In-HF (national)
Cardiac arrest	X		RIAC (national)

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **No**
U.S. **No**
European **Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No

There are diplomas for Acute Cardiac Care only available in some universities but not endorsed by the NCS

For allied professionals?

No

For training centres?

No

- **National Cardiac Society supporting ACCA certification system**
  No
- **Official national competency guidelines for acute cardiac care organisation?**
  No
- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**
  No specific training
- **Training centres availability. Please comment on acute cardiac care training in your country.**

We need a specific and structured training in acute cardiac care starting from the university and continuing during the specialization, just as for interventional cardiology, echo or EP.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	1. interventional Cardiologists, 2. Cardiologists; 3. Intensivists	CCU
Hypothermia	1, Intensivists; 2. cardiologists	ICU
Mechanical ventilation	1, Intensivists; 2. cardiologists	1. CCU; 2. ICU
Dialysis	1, Intensivists; 2. cardiologists	1. CCU; 2. ICU
Endomyocardial biopsy	1. interventional Cardiologists, 2. Cardiologists	CCU
Percutaneous coronary angioplasty	1. interventional Cardiologists	CCU
ECMO/ECLS	1. interventional Cardiologists, 2. intensivists	1. CCU; 2. ICU
Non invasive ventilation	Cardiologists; 2. intensivists	1. CCU; 2. ICU
Insertion and monitoring of an arterial lines	Cardiologists; 2. intensivists	1. CCU; 2. ICU
Insertion and monitoring of a central venous catheter	1, Intensivists; 2. cardiologists	1. CCU; 2. ICU
Insertion and monitoring of a pulmonary artery catheter	1, Intensivists; 2. Interventional cardiologists; 3. cardiologists	1. CCU; 2. ICU
Pericardiocentesis	1. cardiologists; 2. Interventional cardiologists	1. CCU; 2. ICU
Transvenous temporary pacing	Cardiologists	1. CCU; 2. ICU
Echocardiography transesophagial	1. Cardiologists; 2. intensivists	1. CCU; 2. ICU
Direct current cardioversion	1. Cardiologists; 2. intensivists	1. CCU; 2. ICU
Echocardiograhy transthoracic	1. Cardiologists; 2. intensivists	1. CCU; 2. ICU

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	30.000	1,cardiologists; 2. Intensivists	CCU; ICU
NSTEMI	40.000	1,cardiologists; 2. Intensivists	CCU; ICU
Sudden cardiac death	N/A	1,cardiologists; 2. Intensivists	CCU; ICU
Pericarditis non complicated	N/A	1,cardiologists; 2. Intensivists	Sub-intensive unit
Cardiogenic shock	4000	1,cardiologists; 2. Intensivists	CCU; ICU
Cardiac tamponade	200	1,cardiologists; 2. Intensivists	CCU; ICU
Type A aortic dissection	N/A	1, Intensivists; 2. cardiologists	ICU
Conduction disturbances with syncope	N/A	1,cardiologists; 2. Intensivists	CCU
Pulmonary edema	7000	1,cardiologists; 2. Intensivists	CCU; ICU
Non-complicated type B dissection	N/A	1, Intensivists; 2. cardiologists	ICU

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**

11. Sites and units that manage patients who need acute cardiac care

ACS, complicated STEMI, and AHF are mainly managed in CCUs, by Cardiologists, with access to specific cardiology invstigations and techniques (echo, TEE, PM, IABP). On the other hand intensivists mainly manage highly complicated patients where non-cardology specific tools are required (eg invasive ventilatory support, dialysis, etc..)

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	X				
Lack of reimbursement,	2		X			
Limited financial resources	2		X			
Lack of trained personnel	2		X			
Low awareness of guidelines	2		X			
Lack of operators	2		X			
Lack of referral	3			X		

LITHUANIA

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
2958	18.2	17.2	67	26 643

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
33	25.9	29.3	13.7	893.1	451.1

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
3.5	24.4	6.2	12.1	32.6

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
428	70	38	86	154	755	15	18

*per 100 000 population

1. Name of National Cardiac Society

Lithuanian Society of Cardiology; Lithuanian Cardiac Care and Emergency Medicine Association.

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

National Working Group on acute cardiac care at Lithuanian Society of Cardiology; Lithuanian Cardiac Care and Emergency Medicine Association

3. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

There is a Lithuanian health minister law, that is prepared according to the ESC guidelines.
The treatment is organised according to the European guidelines from 2011.

- **In hospitals**

There are 5 centers in Lithuania that perform PCIs 24/7. In PCI centres the treatment is organised according to the latest guidelines with primary PCI.
When a patient is treated with STEMI in a rural hospital, usually thrombolysis is given. Then the patient is transferred to a PCI centre to perform PCI.

4. How hospitals are reimbursed for acute cardiac care patients

There is national health insurance fund that covers the treatment for all patients. For AMI patients the government covers treatment with clopidogrel only. Ticagrelor and prasugrel are not covered by the government scheme. DES constitutes only 40% of all stents.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement or incentives. There is No separate compensation per patient.

Hospitals

Hospital does not receive reimbursement or incentives

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the ESC guidelines ·

5. National or large regional registries

***No**TE: please indicate registries even regional ones that might be of interest even if you do not have the full name. Good regional registries might allow for extrapolation to national or even European level.*

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		Regional ACS registry
Acute heart failure		X	
Cardiac arrest		X	

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **Yes**
U.S. **No**
European **Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

Yes, the Society advises ACCA certification, but it does not promote national certification

- **Official national competency guidelines for acute cardiac care organisation?**

Yes

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

suggested

- **Training centres availability. Please comment on acute cardiac care training in your country.**

There are 2 universities that train cardiology residents. Lithuanian Society of Cardiology, Lithuanian Heart Association and Lithuanian Cardiac Care and Emergency Medicine Association performed the educational conferences and various trainings.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	1. Intervensive Cardiologists, 2. Intensivist Cardiologist), 3. Anesthesiologist.	ICU, cathlab.
Hypothermia	1. Intervensive Cardiologists, 2. Intensivist Cardiologist), 3. Anesthesiologist.	ICU, cathlab.
Mechanical ventilation	1. Intervensive Cardiologists, 2. Intensivist Cardiologist), 3. Anesthesiologist.	ICU, cathlab.
Dialysis	1. Cardiologist 2. Intensivist, 3. nephrologist.	ICU.
Endomyocardial biopsy	Intervensive Cardiologists	cathlab
Percutaneous coronary angioplasty	Intervensive Cardiologists	cathlab
ECMO/ECLS	1. Intervensive Cardiologists, 2. Intensivist Cardiologist), 3. Anesthesiologist.	ICU, cathlab.
Non invasive ventilation	1. Cardiologist 2. Intensivist, 3. anesthesiologist.	ICU
Insertion and monitoring of an arterial lines	1. Cardiologist 2. Intensivist, 3. anesthesiologist.	ICU
Insertion and monitoring of a central venous catheter	1. Cardiologist 2. Intensivist, 3. anesthesiologist.	ICU
Insertion and monitoring of a pulmonary artery catheter	Intervensive Cardiologists	cathlab, ICU.
Pericardiocentesis	1. Intervensive Cardiologists, 2. Cardiologist,, 3. Anesthesiologist.	ICU, cathlab.
Transvenous temporary pacing	1. Intervensive Cardiologists, 2. Intensivist Cardiologist), 3. Anesthesiologist.	ICU, cathlab.
Echocardiography transesophagial	1. Intervensive Cardiologists, 2. Intensivist Cardiologist), 3. Anesthesiologist.	ICU, cathlab.
Direct current cardioversion	1. Intervensive Cardiologists, 2. Intensivist Cardiologist), 3. Anesthesiologist.	ICU, cathlab.
Echocardiograhy transthoracic	1. Cardiologist 2. Intensivist, 3. nephrologist.	ICU.

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	6000	1. Cardiologist 2. Intensivist, 3. anesthesiologist.	ICU
NSTEMI	11000	1. Cardiologist 2. Intensivist, 3. anesthesiologist.	ICU, Cardiology general ward.
Sudden cardiac death	500	1. Intensivist 2. anesthesiologist, 3. Cardiologist .	ICU
Pericarditis non complicated	120	Cardiologist	Cardiology general ward.
Cardiogenic shock	400	1. Cardiologist 2. Intensivist, 3. anesthesiologist.	ICU
Cardiac tamponade	90	1. Intervensive Cardiologists, 2. Cardiologist,, 3. Anesthesiologist.	ICU, cathlab.
Type A aortic dissection	50	Cardiac Surgents, intensivist, anesthesiologist, cardiologist.	ICU
Conduction disturbances with syncope	280	Intensivist, cardiologist, anesthesiologist, electropnysiologist	ICU
Pulmonary edema	1500	Cardiologist, intensivist, anesthesiologist	ICU, Cardiology general ward.
Non-complicated type B dissection	60	Cardiologist, intensivist, invasive cardiologist	ICU, Cardiology general ward.

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

In ICU the work is performed by cardiologists, anesthesiologists, intensivists and residents.
In Catheter laboratories the work is done by interventional cardiologsts.
In general wards the work is performed by cardiologists.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	2		X			
Lack of referral	3			X		
Lack of trained personnel	3			X		
Low awareness of guidelines	3			X		
Lack of operators	3			X		
Lack of reimbursement,	4				X	
Limited financial resources	4				X	

The main obstacles are the lack of financial resources, that the patients come to the hospital late and that there is No government control of the treatment quality.

LAVTIA

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
2013	18.7	16.6	68	23 337

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
32	23.7	29.8	14.3	910.9	470.5

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
3.4	19.0	5.7	9.8	36.5

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
319	74	43	…	95	488	13	93

*per 100 000 population

1. Name of National Cardiac Society

Latvian Society of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Intensive Cardiology Working Group

3. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

The patients with Acute coronary syndrome with ST elevation are hospitalized according to a National STEMI algorithm – depending on the individual patient's location and revascularization possibilities.

- **In hospitals**

The regional hospitals - The patients with acute cardiac pathologies are admitted initially in the emergency department, then according to the presenting condition, transferred to general Intensive care unit or the Department of Internal disease.
University hospitals (tertiary centres) – The patients with acute cardiac pathologies are admitted directly to ACCU (acute cardiac care unit).

4. How hospitals are reimbursed for acute cardiac care patients

Per patient reimbursement

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement or incentive

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the ESC guidelines or the National guidelines

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	+		National Register of Acute Coronary Syndroms
Acute heart failure		+	
Cardiac arrest		+	

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines

Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**Yes**
U.S.	**No**
European	**Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No

For allied professionals?

No

For training centres?

No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

Yes

National guidelines of management of acute coronary syndrome. 2011.
Heart failure guidelines. 2013.

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Specific training

- **Training centres availability. Please comment on acute cardiac care training in your country.**

No

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologist (Intensivist) nvasive cardiologist	Acute cardiac care unit (ACCU) Cath. Lab.
Hypothermia	Cardiologist (Intensivist)	Acute cardiac care unit (ACCU)
Mechanical ventilation	Cardiologist (Intensivist)	Acute cardiac care unit (ACCU)
Dialysis	Cardiologist (Intensivist)	Acute cardiac care unit (ACCU)
Endomyocardial biopsy	Invasive cardiologist	Cath. Lab.
Percutaneous coronary angioplasty	Invasive cardiologist	Cath. Lab.
ECMO/ECLS	Cardiac surgeon	Cardiac surgery Intensive care
Non invasive ventilation	Cardiologist (Intensivist)	Acute cardiac care unit (ACCU)
Insertion and monitoring of an arterial lines	Cardiologist (Intensivist)	Acute cardiac care unit (ACCU)
Insertion and monitoring of a central venous catheter	Cardiologist (Intensivist)	Acute cardiac care unit (ACCU)
Insertion and monitoring of a pulmonary artery catheter	Cardiologist (Intensivist)	Acute cardiac care unit (ACCU)
Pericardiocentesis	Cardiologist (Intensivist) Cardiac surgeon	Acute cardiac care unit (ACCU) Cardiac surgery Intensive care
Transvenous temporary pacing	Cardiologist (Intensivist)	ACCU
Echocardiography transesophagial	Echo specialist	EchoLab
Direct current cardioversion	Cardiologist (Intensivist)	ACCU
Echocardiograhy transthoracic	Cardiologist (Intensivist) Echo specialist	ACCU EchoLab

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	~ 1200	Cardiologist (Intensivist) Invasive cardiologist Intensivist	ACCU General Intensive care unit
NSTEMI	~ 4500	Cardiologist (Intensivist) General cardiologist Invasive cardiologist Intensivist	ACCU General Intensive care Cardiological department Departement of Internal disease

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients Managed mostly by intensivists	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

In whole country the patients with acute cardiac pathologies are managed by non-cardialogist (Intensivist, Internist). The cardiologist are available in secondary and tertiary level hospitals.
We have 4 PCI centres where cardiologists are on site 24h/7 day per week. In others hospitals specialist of Internal disease are available.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of trained personnel	2		X			
Low awareness of guidelines	2		X			
Lack of centres	3			X		
Lack of referral	3			X		
Lack of operators	3			X		
Lack of reimbursement,	4				X	
Limited financial resources	4				X	

MACEDONIA

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
2066	11.7	15.1	59	12 938

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
…	19.6	27.3	9.3	939.5	553.0

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
3.2	11.0	6.4	13.2	31.1

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
275	60	…	…	80	360	13	10

*per 100 000 population

1. Name of National Cardiac Society

MACEDONIAN SOCIETY OF CARDIOLOGY

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

We have No specific national body, but we have Working groups for patients with heart failure, Invasive and interventional cardiology, Cardiac arrhythmias and electrophysiology. These groups cover different areas of expertise for patients who need acute cardiac care.

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

For the treatment of STEMI, we have a primary PCI network, and so STEMI patients are transported to the nearest PCI centre. However there is a time delay because the Emergency medicine services first have to transport the patient to the nearest Hospital (to which they are attached), and then from there to the PCI Centre (depending on where the patient is from). So, for patients living in more rural areas there are at least two stops by the time they reach the PCI Centre.

Patients with pulmonary oedema are initially treated by Emergency medicine teams, and transported to the nearest hospital with a ward for cardiology treatment.

Patients from all over the country with suspected Acute aortic syndrome are transported to The University Clinic of Cardiology (the only one in the country) for investigation, and then if needed they are transported to a Cardiac Surgical centre, so there is also a time delay, which may be particularly important if a Type A dissection is in question.

Also, only one centre in the country undertakes temporary pacemaker placement, and so transport for pacing is usually required (with medical support).

- **In hospitals**

For STEMI treatment in PCI Centres there is 24/7 coverage, and an interventional cardiologist is either on site, or on call. Time delays for door to needle varies, but probably around 5-30 min.

For all other conditions patients go through the Emergency ambulance and than to ICCU. For some of the diagnostic procedures (CT) patients have to be transported to the Radiology clinic on the University Campus.

4. How hospitals are reimbursed for acute cardiac care patients

We have a system of flat rate packages from pre-established lists of pathologies, interventions and coexisting morbidity. It is a DRG system (Diagnoses Related Groups) for reimbursement, introduced by the State Health Insurance Fund.

In practise it means that reimbursement sometimes doesn't cover the total costs per patient.

For example in patients admitted with chronic heart failure, under the DRG system the reimbursement is around 400 Euro's, No matter what treatment the patient receives. So, if the patient requires ultrafiltration (performed at a nephrology clinic) it will cost around 1700 Euro's, and this amount is not covered by the reimbursement system.

Another example is reimbursement for patients with pulmonary thromboembolism, which is around 800 Euro's. If we treat the patient with fibrinolysis, this costs around 800 Euro's on its own.

So, the public health hospitals are actually expected to survive without sufficient reimbursement.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

<u>Physicians</u>

Physician does not receive reimbursement or incentive ♦

Hospitals
Hospital does not receive reimbursement, but incentives occur (e.g. more budget on the following year) ♦

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the National guidelines ♦

5. National or large regional registries

Registries relevant to acute cardiac care	**Yes**	**No**	**Name**
Acute coronary syndromes	Yes		STEMI – Regional Registry for patients with acute coronary Syndrome at the level of University Clinic (the only one in the country)
Acute coronary syndromes (international registry)	Yes		ISACS-CT (International Survey of Acute Coronary Syndrome in Transitional Countries)
Acute heart failure		No	
Cardiac arrest		No	
Atrial fibrillation	Yes		National Registry for atrial fibrillation
Venous thromboembolism	Yes		National Registry for venous thromboembolism

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines

Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**Yes** but adapted from the ESC
U.S.	**No**
European	**Yes**

At the state level, as an initiative from The Ministry of Health, there is a permanent Working group on adopting and adapting Clinical Practise Guidelines. Members of this group are in constant close collaboration with National Societies.

In the area of cardiology, we adopt Guidelines of The European Society of Cardiology.
The Translated National Guidelines are adjusted for the three levels of health care - primary, secondary and tertiary, but at this point we don't have any implementation tools.

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No

There is No any form of certification available for acute cardiac care at the institutional or national level.
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Yes

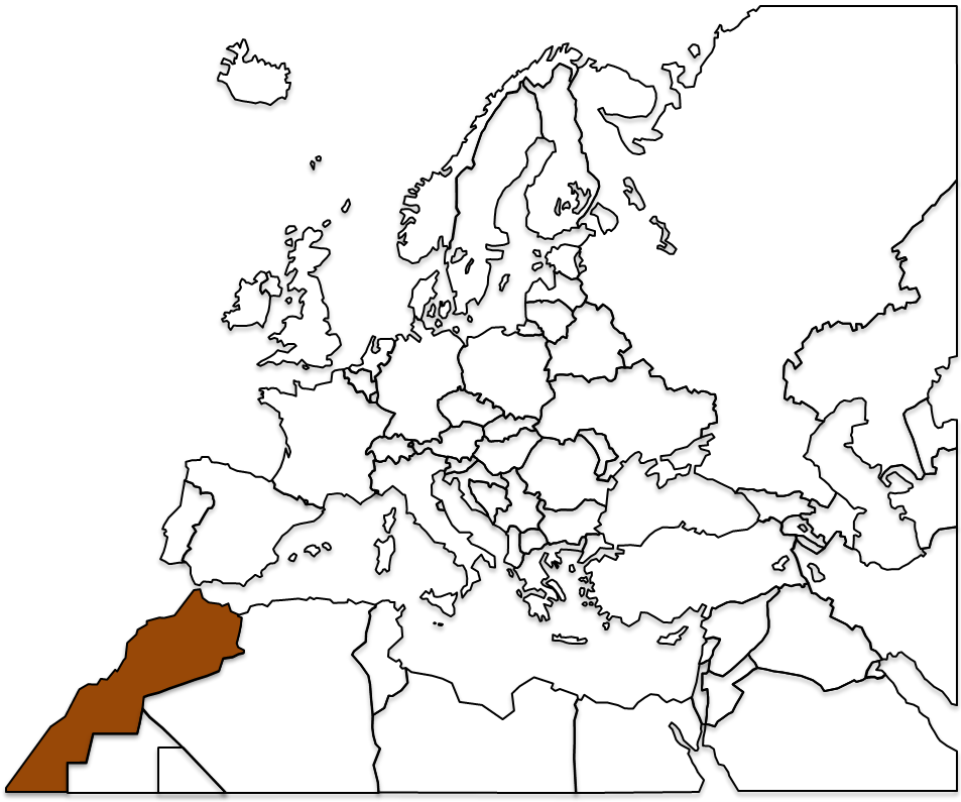
This period is provided as part of specialist training, and it might be from 1-2 up to 12 months, depending on the type of specialization.

For example, for specialization in internal medicine it's about 6 months, 6 months for specialization in Urgent medicine (6 months in ICCU and cardiology word). For specialization in cardiology 12 months in ICCU unit.

- **Training centres availability. Please comment on acute cardiac care training in your country.**

Acute cardiac care training is a part of the training of residents specializing in cardiology, and also a part of the training of residents in emergency medicine.

MOROCCO



1. Name of National Cardiac Society

MOROCCAN SOCIETY OF CARDIOLGY

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

None

3. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

NA

- **In hospitals**

NA

4. How hospitals are reimbursed for acute cardiac care patients

NA

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physician does not receive reimbursement or incentive

Hospitals

Hospital does not receive reimbursement or incentive

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the ESC guidelines ·

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		
Acute heart failure	X		
Cardiac arrest		X	

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **No**
U.S. **No**
European **Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

Yes, the Society demands ACCA certification for practice

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Suggested

- **Training centres availability. Please comment on acute cardiac care training in your country.**

No comment

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	INTENSIVISTS	CARE UNIT
Hypothermia	INTENSIVISTS	CARE UNIT
Mechanical ventilation	INTENSIVISTS	CARE UNIT
Dialysis	INTENSIVISTS	CARE UNIT
Endomyocardial biopsy	CARDIOLOGISTS	SURGICAL CARDIAC UNIT
Percutaneous coronary angioplasty	CARDIOLOGISTS	CORONARY CARE UNIT
ECMO/ECLS	CARDIAC SURGEON	CARDIAC CARE UNIT
Non invasive ventilation	INTENSIVISTS	CARE UNIT
Insertion and monitoring of an arterial lines	VASCULAR SURGEON	SURGICAL UNIT
Insertion and monitoring of a central venous catheter	INTENSIVISTS	CARE UNIT
Insertion and monitoring of a pulmonary artery catheter	VASCULAR SUGEON	SURGICAL UNIT
Pericardiocentesis	CARDIAC SURGEON	SURGICAL CARDIAC UNIT
Transvenous temporary pacing	CARDIOLOGISTS	RHYTHMOLOGY UNIT
Echocardiography transesophagial	CARDIOLOGISTS	CARDIAC UNIT
Direct current cardioversion	CARDIOLOGISTS	CARDIAC CARE UNIT
Echocardiograhy transthoracic	CARDIOLOGISTS	CARDIAC UNIT

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	NA	CARDIOLOGISTS	ACUTE CARDIAC UNIT
NSTEMI	NA	CARDIOLOGISTS	ACUTE CARDIAC UNIT
Sudden cardiac death	NA	INTENSIVISTS	ACUTE CARE UNIT
Pericarditis non complicated	NA	CARDIOLOGISTS	ACUTE CARDIAC UNIT
Cardiogenic shock	NA	CARDIOLOGISTS	ACUTE CARDIAC UNIT
Cardiac tamponade	NA	CARDIOLOGISTS	ACUTE CARDIAC UNIT
Type A aortic dissection	NA	CARDIOLOGISTS	ACUTE CARDIAC UNIT
Conduction disturbances with syncope	NA	CARDIOLOGISTS	ACUTE CARDIAC UNIT
Pulmonary edema	NA	CARDIOLOGISTS	ACUTE CARDIAC UNIT
Non-complicated type B dissection	NA	CARDIOLOGISTS	ACUTE CARDIAC UNIT

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	General Medical unit	Dedicated Acute cardiac care unit managed mainly by non cardiologists	Dedicated Acute cardiac care unit managed mainly by cardiologists
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** ☐ Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

NA

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Low awareness of guidelines	1	X				
Lack of operators	3			X		
Lack of reimbursement,	4				X	
Lack of trained personnel	4				X	
Lack of centres	5					X
Limited financial resources	5					X
Lack of referral	5					X

NETHERLANDS

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
16804	16.5	19.8	83	47 131

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
26	19.8	18.1	8.4	533.5	136.4

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
1.6	11.7	12.9	20.7	5.4

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
329	50	25	78	83	840	14	38

*per 100 000 population

1. Name of National Cardiac Society

Dutch Society of Cardiology (English), Nederlandse Vereniging voor Cardiologie (NVVC)

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Working Group ACS Dutch Society of Cardiology

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Managed by the Ambulance Zorg Nederland (AZN). www.ambulancezorg.nl. They work according to a strict protocol (LPA), updated every 2 years. I enclose the latest version

- **In hospitals**

There is No specific national organisation of acute cardiac care patients in-hospital.

4. How hospitals are reimbursed for acute cardiac care patients

The reimbursement is the same as for non-acute patients: based on diagnosis (diagnose-behandel-combinatie: fixed amount of money per diagnosis)

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physicians do not receive reimbursement or incentive

Hospitals

Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the ESC guidelines ·

5. National or large regional registries

***No**TE: please indicate registries even regional ones that might be of interest even if you do not have the full name. Good regional registries might allow for extrapolation to national or even European level.*

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		NCDR ACS Registry, NCDR PCI Registry (www.ncdr.nl)
Acute heart failure		X	
Cardiac arrest	X		Regional OHCA registries

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **No**
U.S. **No**
European **Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

No

NORWAY

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
5080	15.5	19.9	79	64 893

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
27	23.1	18.4	8.4	518.6	146.2

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
1.3	19.3	9.6	18.3	14.0

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
431	45	27	78	70	1667	11	72

*per 100 000 population

1. Name of National Cardiac Society

Norwegian Society of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

WG on acute cardiac care of the Norwegian Society of Cardiology

3. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

Call to central emergency service activates an ambulance, patient will be handled according to algorithms, including choice of hospital according to pathology suspected. Helicopter service is also included in the prehospital service system, and is often necessary to transport patients living far away from the hospitals (e.g. Nothern Norway).

- **In hospitals**

Mostly patients are taken to nearest hospital, except patients with STEMI, cardiac arrest or hemodynamic instability. For these patients, immediate transfer by ambulance to tertiary care hospitals with PCI and ICCU is recommended.

4. How hospitals are reimbursed for acute cardiac care patients

Hospitals are reimbursed via the Norwegian government according to the service provided. The reimbursement is dependent on the number of patients and procedures performed in the hospital the previous year.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physicians do not receive reimbursement or incentive

Hospitals

Hospitals do not receive reimbursement, but incentive in the form of more budget in the following year

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the ESC guidelines ·

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		National Myocardial Infarction Registry
Acute heart failure		X	
Cardiac arrest patients	X		National Cardiac arrest Registry

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **No**
U.S. **No**
European **Yes**, with national specific recommendations

7. Education

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

Yes
The "Norwegian Resuscitation Council" makes national guidelines for advanced heart-lung resuscitation procedures, and teaching guidelines.

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques**.

Yes suggested

- **Training centres availability. Please comment on acute cardiac care training in your country.**

Available training at all the University Hospitals in Oslo, Bergen, Tronheim and Tromsø.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	cardiologist	ICCU
Hypothermia	cardiologist	ICCU
Mechanical ventilation	Cardiologist or intensivist	ICCU
Dialysis	Nephrologist/Intensivist	ICCU/nephrology or ICU
Endomyocardial biopsy	Cardiologist	Angio lab
Percutaneous coronary angioplasty	Cardiologist	Angio lab
ECMO/ECLS	Cardiologist and cardiothoracic surgeon	ICCU
Non invasive ventilation	Cardiologist Intensivist Internal medicine	ICCU, CCU or ICU
Insertion and monitoring of an arterial lines	Cardiologist Intensivist Internal medicine	ICCU, CCU or ICU
Insertion and monitoring of a central venous catheter	Cardiologist Intensivist/Anesthesiologist	ICCU ICU of Emergency department
Insertion and monitoring of a pulmonary artery catheter	Cardiologist Intensivist/Anesthesiologist	ICCU
Pericardiocentesis	Cardiologist	Angio lab

Transvenous temporary pacing	Cardiologist	CCU
Echocardiography transesophagial	Cardiologist	CCU
Direct current cardioversion	Cardiologist	CCU
Echocardiograhy transthoracic	Cardiologist	CCU

ICCU – intensive cardiac care unit (highest level in our country)
ICU – intensive care unit

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	3.500	Cardiologist	ICCU in tertiary care and ICU in secondary care
NSTEMI	10.000	Cardiologist or internal medicine physician	CCU or ward
Sudden cardiac death		Cardiologist and/or intensivist	ICCU or in community hospital ICU, then transferred to ICCU
Pericarditis non complicated		Cardiologist	Cardiology ward or internal medicine
Cardiogenic shock		Cardiologist	ICCU
Cardiac tamponade		Cardiologist	ICCU
Type A aortic dissection		Cardiologist/cardiovascular surgeon	ICCU
Conduction disturbances with syncope		Cardiologist (in community hospital intensivist or internal medicine physician)	ICCU or ICU
Pulmonary edema		Cardiologist (in community hospital intensivist or internal medicine physician)	ICCU or in nearest hospital ICU, then transferred
Non-complicated type B dissection		Cardiologist/cardiovascular surgeon	CCU

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country Manage acute cardiac care patients Managed mostly by intensivists	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No**	Common in country **No** Mostly in academic hospitals
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

Tertiary care hospitals with ICCU, 24/7 PCI and cardiac surgeon:

1. Oslo University Hospital, Oslo
2. Trondheim University Hospital,Trondheim
3. Haukeland University Hospital, Bergen
4. Stavanger University Hospital, Stavanger
5. University Hospital of North Norway

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of trained personnel	1	X				
Low awareness of guidelines	2		X			
Lack of operators	2		x			
Lack of reimbursement,	2		X			
Lack of centres	2		X			
Limited financial resources	2		x			
Lack of referral	2		x			

The main difficulties are the lack of scientific evidence for some of the treatments we offer to our acute cardiac care patients (e.g. Impella, IABP, hypothermia), and the ongoing discussions on how to treat these patients optimally. Another difficulty is the long transfer distances to a tertiary hospital in some parts of Norway (especially the North).

POLAND

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
38502	14.0	18.0	61	24 882

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
32	25.2	28.1	10.0	746.8	323.6

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
2.5	16.5	6.7	11.1	22.8

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
221	56	…	21	100	521	10	35

*per 100 000 population

1. Name of National Cardiac Society

Polish Cardiac Society

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

WG on acute cardiac care

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Most patients requiring acute cardiac care are carried by ambulances to the nearest hospital having with emergency department. Ambulances are sent to patients' home or dispensaries by central emergency service following a phone call.

- **In hospitals**

Patients are taken to nearest emergency department or hospital emergency rooms. Special algorithms and cathlabs network exist for patients with acute coronary syndromes. Patients with STEMI or unstable NSTEMI patients are transported directly to the nearest PCI – capable center after ECG teletransmission.

4. How hospitals are reimbursed for acute cardiac care patients

Hospitals are reimbursed via National Health Fund payments according to pre-established lists of pathologies and technical interventions

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physicians do not receive reimbursement or incentives

Hospitals

Hospitals receive per patient reimbursement, but pre-specified budgets exist. For patients with ACS, usually full reimbursement in provided, even if the pre-specified budged is exceeded. For other acute cardiac care patients this is not the case.

- **Treatment availability for acute cardiac care**

We treat all patients as required, but this work may not be reimbursed if the pre-specified budget has been exceeded during a particular period

We are restricted to certain number of treatments/budget per year

5. National or large regional registries

***No**TE: please indicate registries even regional ones that might be of interest even if you do not have the full name. Good regional registries might allow for extrapolation to national or even European level.*

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		Myocardial Infarction Registry
Acute heart failure		X	
Cardiac arrest		X	

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **No**
U.S. **No**
European **Yes**, with national specific recommendations

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
Polish Cardiac Society is working on a national certification (as a sub-speciality) for acute cardiac care. These efforts are hampered by Polish Society of Anaesthesiology.
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

Yes, the Society advises ACCA certification, but it does not require national certification

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Yes Required 6 months during 6 year of specialisation period

- **Training centres availability.**

Available training centres in tertiary and university hospitals

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologist/cardiac surgeon/cardio-anestesiologist	ICCU/cardiac surgery ICU
Hypothermia	Cardiologist/Intensivist	ICCU/ED/ICU
Mechanical ventilation	Cardiologist/Intensivist/	ICCU/ICU/ED
Dialysis	Nephrologist/Intensivist/Cardiologist	ICCU/ICU
Endomyocardial biopsy	Cardiologist	Cath lab
Percutaneous coronary angioplasty	Cardiologist	Cath lab
ECMO/ECLS	Cardio-anestesiologist/Cardiac surgeon	cardiac surgery ICU
Non invasive ventilation	Cardiologist/Intensivist	ICCU ICU of Emergency department
Insertion and monitoring of an arterial lines	Cardiologist/Intensivist	ICCU ICU of Emergency department
Insertion and monitoring of a central venous catheter	Cardiologist/Intensivist	ICCU ICU of Emergency department
Insertion and monitoring of a pulmonary artery catheter	Cardiologist/ Cardio-anestesiologist	ICCU/ cardiac surgery ICU
Pericardiocentesis	Cardiologist/cardiac surgeon	ICCU/ cardiac surgery ICU

Transvenous temporary pacing	Cardiologist	ICCU
Echocardiography transesophagial	Cardiologist	ICCU
Direct current cardioversion	Cardiologist with supervision of anestesiologist	ICCU
Echocardiograhy transthoracic	Cardiologist	ICCU

ICCU – intensive cardiac care unit
ICU – intensive care unit

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	830/mln	Cardiologist	ICCU in PCI –capable centres
NSTEMI	1230/mln	Cardiologist	ICCU
Sudden cardiac death	ND	Cardiologist or Intensivist	ICCU or in nearest hospital ICU
Pericarditis non complicated	ND	Cardiologist, Internal medicine physician	Cardiology or internal medicine
Cardiogenic shock	ND	Cardiologist	ICCU
Cardiac tamponade	ND	Cardiologist, Cardiac Surgeon	ICCU
Type A aortic dissection	ND	Cardiologist/cardiac surgeon)	ICCU/cardiac surgery ICU
Conduction disturbances with syncope	ND	Cardiologist	ICCU
Pulmonary edema	ND	Cardiologist, emergency department intensivist or internal medicine physician	ED or in nearest hospital ICU, ICCU
Non-complicated type B dissection	ND	Cardiologist/cardiac surgeon	ICCU or department of cardiac surgery

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Nox**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Nox**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

In Poland, to be accredited for reimbursment for cardiac procedures and the care of cardiac patients (ie to have a contract with the National Health Fund) a Department of Cardiology must have a fully equiped ICCU with at least one ventilator, IABP, hemo-dialysis equipment, temporary pacemakers, 24/7 echocardiography and separate cardiologist on-call rota.

However some cardiac pathologies such as pulmonary edema, acute heart failure, and pulmonary embolism may be reimbursed within Internal Medicine so approximately 40% of acute cardiac care patients are treated there.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of trained personnel	1	X				
Limited financial resources	1	x				
Lack of reimbursement,	2		x			
Lack of referral	2		x			
Low awareness of guidelines	4				x	
Lack of operators	4				x	
Lack of centres	4				x	

In Poland only ACS patients are fully reimbursed, while reimbursement for other acute cardiac patients is too low and limited by the hospital contract with the National Health Fund.

PORTUGAL

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
10457	19.2	19.7	61	28 327

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
22	20.1	22.1	10.3	562.3	152.3

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
2.1	10.9	9.7	12.9	26.6

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
426	53	…	57	105	605	14	25

*per 100 000 population

1. Name of National Cardiac Society

Portuguese Society of Cardiology - PSC

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Study Group of Cardiac Intensive Care of PSC

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Portugal has a pre-hospital emergency system - the National Institute for Medical Emergencies (INEM) - covering the whole country, urban and rural, and activated by calling 112.
The INEM has vehicles without doctors with facilities for *Basic Life Support* and AED and cars with Medical staff with the ability to perform *Advanced Live Support*. Most are able to carry out ECGs on site to make the diagnosis of STEMI, and then to take patients directly to a centre with primary PCI. In other cases patients are taken to the nearest hospital.

- **In hospitals**

Portugal has a hospital network covering the entire country, all of which have emergency services. All hospitals use The Manchester System, which defines the clinical priorities. The most critical patients are treated in emergency rooms and then admitted to general intensive care units or coronary units according the clinical situation. The STEMI patients diagnosed prehospitally, go directly to a catheter laboratory and then to the coronary units, bypassing the emergency department.

4. How hospitals are reimbursed for acute cardiac care patients

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physicians do not receive reimbursement or incentives

Hospitals

Hospitals receive per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the ESC guidelines.

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	x		Portuguese Registry on Acute Coronary Syndromes ProACS
Acute heart failure		x	
Cardiac arrest		x	

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**Yes**
U.S.	**No**
European	**Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No

For allied professionals?

No

For training centres?

No

- **National Cardiac Society supporting ACCA certification system**

Yes, the Society advises ACCA certification, but it does not require national certification

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Yes Required 5 Months

- **Training centres availability. Please comment on acute cardiac care training in your country.**

For training in the specialty of cardiology a minimum of five months in a cardiac intensive care is required. The coronary intensive care units are used for training cardiologists and physicians of other specialties who wish to practice in acute cardiac care.

There are coronary units without advanced therapies such as hemofiltration or ventricular assist devices and training in these is done in specific units

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologists Intensivists	Acute Cardiac care unit
Hypothermia	Intensivists Cardiologists	1-Emergency Department 2-General Intensive Care Unit 3-Acute Cardiac care unit
Mechanical ventilation	Intensivists Cardiologists	1-General Intensive Care Unit 2-Acute Cardiac care unit
Dialysis	1-Nephrologist 2-Intensivists 3-Cardiologists	1-General Intensive Care Unit 2-Acute Cardiac care unit
Endomyocardial biopsy	1-heart surgeon	1-Acute Cardiac care unit
Percutaneous coronary angioplasty	1-Cardiologists	Interventional cardiology units
ECMO/ECLS	1-heart surgeon 2-Cardiologist	1-Acute Cardiac care unit
Non invasive ventilation	1-Intensivists 2- Cardiologists	1-Emergency Department 2-General Intensive Care Unit 3-Acute Cardiac care unit
Insertion and monitoring of an arterial lines	1-Intensivists 2- Cardiologists	1-Emergency Department 2-General Intensive Care Unit 3-Acute Cardiac care unit
Insertion and monitoring of a central venous catheter	1-Intensivists 2- Cardiologists	1-Emergency Department 2-General Intensive Care Unit 3-Acute Cardiac care unit
Insertion and monitoring of a pulmonary artery catheter	1-Intensivists 2- Cardiologists	1-General Intensive Care Unit 2-Acute Cardiac care unit
Pericardiocentesis	1-Cardiologists	1-Interventional cardiology units 2-Acute Cardiac care unit
Transvenous temporary pacing	Cardiologists 2 - Intensivists	Acute Cardiac care unit General Intensive Care Unit
Echocardiography transesophagial	Cardiologists 2 - Intensivists	Acute Cardiac care unit General Intensive Care Unit
Direct current cardioversion	Cardiologists	1-Acute Cardiac care unit
Echocardiograhy transthoracic	Cardiologists 2 - Intensivists	Acute Cardiac care unit General Intensive Care Unit

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	5500	Cardiologists	1-Interventional cardiology units 2-Acute Cardiac care unit
NSTEMI	6500	Cardiologists	1-Acute Cardiac care unit
Sudden cardiac death	NA	1 Cardiologists	1-General Intensive Care Unit

		2 Intensivists	2-Acute Cardiac care unit
Pericarditis non complicated	NA	Cardiologists	Cardiology wards
Cardiogenic shock	NA	1 Cardiologists 2 Intensivists	1-Acute Cardiac care unit
Cardiac tamponade	NA	Cardiologists	1-Acute Cardiac care unit
Type A aortic dissection	NA	Cardiologists	1-Acute Cardiac care unit
Conduction disturbances with syncope	NA	Cardiologists	1-Acute Cardiac care unit
Pulmonary edema	NA	1 Intensivists 2 Cardiologists	1-Emergency Department 2-General Intensive Care Unit 3-Acute Cardiac care unit
Non-complicated type B dissection	NA	Cardiologists	1-Acute Cardiac care unit

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**	Common in country **Yes** Mostly in academic hospitals **No**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

Most acute heart patients are admitted to dedicated Acute cardiac care unit. Most have 5 to 10 beds. Thirty percent are Level B, same number Level M and forty percent Level I. Eighty percent have dedicated fixed team, mostly managed by cardiologists.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Low awareness of guidelines	3			x		
Lack of centres	4				x	
Lack of referral	4				x	
Lack of trained personnel	4				x	
Lack of reimbursement,	5					x
Limited financial resources	5					x
Lack of operators	5					x

We need more beds in cardiac intensive care above all Level I, for reference of patients
Limited financial resources and doctors underpaid generate a lack of human resources.

ROMANIA

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
21267	15.0	16.1	57	19 401

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
28	21.7	27.4	12.0	901.3	507.9

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
2.3	20.9	5.3	12.2	19.7

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
248	69	24	60	92	565	14	96

*per 100 000 population

1. Name of National Cardiac Society

Romanian Society of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Acute Cardiac Care Working Group

3. How the Health Care System is organised to manage acute cardiac care

- ## In the pre-hospital setting

112 – is the phone number for all emergencies. The call is transferred to medical dispach in the case of a medical emergency

Pre-hospital EMS includes two Integrated Services : Ambulance Service and SMURD (mobile service of emergency, resuscitation and extrication - MSERE)

Ambulance service has three types of mobile units for emergencies:

B2 ambulance with nurse (BLS, first aid, telemedicine guided medication administration, telemedicine guided Transfer and decision from the dispach physician)

B1 ambulance with GP physician

C2 ambulance with GP physician having 6 months training in emergency medicine

SMURD (MSERE) has two types of ambulance and helicopter

B2 ambulance with paramedics (firefighters with 3 months training for emergency BLS, first aid), availability of telemedicine transmission to medical dispach – where an emergency physician can make a decision

C1 ambulance and helicopter - intensive mobile unit with emergency physician/anesthesiologist belonging to hospital Emergency Department (ED), nurse from ED and 2 paramedics

The patients may be treated in the field by one of these ambulances, then will be transported to the ED. Also a mobile unit or ambulance transfers the patients from a hospital without Cath lab capability into another with Cath lab when required.

- ## In hospitals

The management of acute cardiac patients is organised according to the type of hospitals.

In Regional Centers, most of the County Hospitals and other hospitals with Cath lab facilities, the patients are admitted to an Emergency Unit (EU) which operates with fully trained emergency medicine doctors, with special training in ALS.

The patients are admitted in two possible ways :

By ambulance (via the pre-hospital protocol)

Patients with STEMI or acute coronary syndrome (ACS) with a pre-hospital diagnosis made directly by the physician or through telemedicine, are admitted to the EU where their personal and medical data are recorded. They are administered analgesic medication, antiplatelet therapy, statins and eventually the patients are transferred directly to the Cath lab. The maximum door-to-needle time is 30 minutes.

The management of patients with other cardiac acute pathology: -

Heart rhythm disturbances – the patient receives a "red" code (emergency), which indicates the need for immediate consultation with a physician. All the measures required for haemodynamic stabilisation are taken, including cardioversion and/or external cardiac pacing.

Cardiogenic shock – again the patient receives a "red" code and then immediate consultation with a physician. The patient is haemodynamically stabilised and every effort is made to make an exact diagnosis (pulmonary thromboembolism, myocardial infarction, etc). When the diagnosis is confirmed, the patient is transferred to a cardiac intensive care unit or Cath lab. If a pulmonary thromboembolism is confirmed, the thrombolytic therapy is started in the EU.

The patients admitted after a *resuscitated cardiac arrest*, are labelled with a "red" code and immediately transferred in the Cath lab if the ECG is suggestive of a STEMI.

The patients who self present

If they are *haemodynamically unstable* – they are labelled with a "red" code and immediate treatment in order to be stabilised and to make an exact diagnosis. Thereafter they follow the same protocol as patients who arrived by ambulance.
Patients *without haemodynamic unstability* are labelled with a "yellow" code (urgent) and received full medical evaluation within a maximum of 10 minutes, to make a diagnosis, initiate emergency therapy if required and then admission to an appropriate ward (or discharge, if appropriate).

Organisation of an Emergency Unit (EU)
In Regional Centers an EU has 2 to 4 work stations of 16 m^2 each ; each station has an ECG monitor with facilities for invasive blood pressure and central venous pressure monitoring and mechanical ventilation.
In County Hospitals, an EU consists of 1-2 work stations, allowing patient stabilisation, but the facilities for invasive blood pressure and central venous pressure monitoring and mechanical ventilation are not reliably present.
All EU have a point-of care unit assessing troponin, myoglobin, D-dimer, blood gases, blood glucose.
In City Hospitals there are just some emergency departments where the patient is stabilised and re-directed to a tertiary centre.
All these structures are connected through a very well developed telemedicine network.

4. How hospitals are reimbursed for acute cardiac care patients

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians
Physicians do not receive reimbursement or incentives
Hospitals
Reimbursement for emergency units and departments is made separately by the Health Ministry from the National Health Budget.
There is a separate reimbursement for :-
STEMI– The National Program for Invasive Treatment of Acute Myocardial Infarction and
Secondary prophylaxis of sudden cardiac death - implantable cardioverter-defibrillators "ICD for life" National Program

- **Treatment availability for acute cardiac care**

No restrictions

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	x		Romanian ST segment elevation myocardial infarction registry RO-STEMI
Acute heart failure	x		Romanian Registry of Acute Heart Failure ROAHFS
Cardiac arrest	x		Romanian Cardiac Arrest Registry

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines

Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**No**
U.S.	**No**
European	**Yes**

The Romanian Society of Cardiology endorses all the guidelines issued by the European Society of Cardiology. The Romanian version of the full text of every ESC guideline is published in the Romanian Journal of Cardiology and the short version is published every year in a book distributed at the National Congress of Cardiology. Both versions are also available online on the Romanian Society of Cardiology website.

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**
  No

- **Official national competency guidelines for acute cardiac care organisation?**
  No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**
  No specific training

- **Training centres availability.**
  Not applicable

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologists	Acute cardiac care unit in centres with Cath lab
Hypothermia	Cardiologists, emergency medicine physicians	Acute cardiac care units
Mechanical ventilation	1.Intensivist	80% in general intensive care units 20% In ACC units level I
Dialysis	1.Intensivist	In general intensive care units
Endomyocardial biopsy	1.Cardiologist	Acute cardiac care unit in centres with cath lab (level I units)
Percutaneous coronary angioplasty	Cardiologist	Acute cardiac care unit in centres with cath lab (level I units)
ECMO/ECLS		
Non invasive ventilation	1.Cardiologist. 2. Intensivist	In level B, M, I units
Insertion and monitoring of an arterial lines	1.Cardiologist 2. Intensivist	In level I units
Insertion and monitoring of a central venous catheter	1.Intensivist, 2. Cardiologist	In level I and M units
Insertion and monitoring of a pulmonary artery catheter	1.Cardiologist,2.Intensivist	In level I units
Pericardiocentesis	1.Cardiologist	In level I units
Transvenous temporary pacing	1.Cardiologist	In level I and M units
Echocardiography transesophagial	1.Cardiologist	In level I units
Direct current cardioversion	1.Cardiologist	In level I, M, B units
Echocardiograhy transthoracic	1.Cardiologist	In level I, M, B units

9. Managements of some common pathologies in acute cardiac care

In Romania, the intensivists work almost exclusively in General Intensive Care Units.
There are very few units of intensive cardiac care which have their own intensivists. These are centres with mixed cardiovascular surgery and cardiac intensive care.
In Romania, only intensivists are allowed to perform and follow mechanical ventilation. In EU, emergency physicians are allowed to intubate the patients and to keep them on mechanical ventilation for maximum 6 hours.
In this respect all the pathology listed below are managed mainly by the cardiologist. If the patient needs to be transferred in an Intensive Care Unit, it will be managed by the intensivist in cooperation with a cardiologist.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	5983 primary PCI in 29/35 centres	All the pathology listed are managed mainly by the cardiologist. If the patient needs to be transferred in an Intensive Care Unit, it will be managed by the intensivist in cooperation with a cardiologist.	
NSTEMI	NA		
Sudden cardiac death	NA		
Pericarditis non complicated	NA		
Cardiogenic shock	NA		
Cardiac tamponade	NA		
Type A aortic dissection	NA		
Conduction disturbances with syncope	NA		
Pulmonary edema			
Non-complicated type B dissection	NA		

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that contribute on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients Managed mostly by intensivists	Common in country **No** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

Data were collected from 18 Romanian centres that responded to a survey conducted by dr. Gabriel Tatu – Chitoiu, dr. Calin Pop, dr.Antoniu Petris, on behalf of the RSC-Acute Cardiac Care WG.

50% were county hospitals, 45% were universitary hospitals and 5% city hospitals. In 67% of centres, these units were managed by the Head of the Cardiology Department and in only 27% of cases did these units have an independent chief, who was a subordinate of the Head of the Cardiology Department.

The medical personnel consisted of Cardiologists only. We only found one physician with competency in general intensive care in one center and two cardiologists accredited in acute cardiac care (both in the same center). None of the USTACCs had a dedicated cardiologist on duty only for the Unit.

In 44% of the centers there were No doctors accredited in CPR, while in 33% of centres all the doctors were accredited.

Central venous cannulation was performed only by the intensivists in 27% of the centres, by some of the cardiologists in 33% of centres and in just 39% all the cardiologists were able to perform this procedure.

Regarding the endo-tracheal intubation, in 22% of centers this was done by the intensivists only, while in 44% of centers the intubation was performed by some of the doctors working in intensive care units and in only 33% of the centers the intubation could be performed by all the doctors involved in intensive care.

We have had 100% coverage by SaO_2 monitors in only 11% of centres. Ventilators were present in only 16% of the units, and ventilation was mamaged by cardiologists. In all other centres there was access to a ventilator in general intensive care.

Image intensifiers were present in 27% of the units, and in the other centres, there was access to a mobile machine from another department.

In 2015 we had 17 catheterisation labs included in our National Programme for Acute Myocardial Infarction.

SLOVAKIA

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
5413	12.4	16.4	55	27 585

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
29	25.7	27.3	9.8	849.7	440.2

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
2.6	19.6	8.2	14.9	22.1

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
300	57	36	…	133	575	13	63

*per 100 000 population

1. Name of National Cardiac Society

Slovak Society of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Working group on acute cardiac care

3. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

Coverage of the country with EMS ambulances. The same system is responsible for STEMI and other acute cardiac care.
There are nine regional centres and one national centre for dispatch. Unique emergency phone number for the country is 155.

- **In hospitals**

General intensive care unit is standard part of all general hospitals. It usually belongs to Internal Medicine department. Tertiary centres including all PCI-centres are equipped with dedicated coronary care units

4. How hospitals are reimbursed for acute cardiac care patients

Per patient reimbursement by health care insurance companies. Payment for hospitalisation differs according to hospitals. Tertiary centres are paid better. Some technical interventions like PCI are paid additionally.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians
Physician receives per patient reimbursement
Hospitals
Hospital receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		SLOVAKS Slovak registry of acute koronary Syndromes
Acute heart failure	X		SLOVASEZ Slovak registry of acute heart failure
Cardiac arrest		X	

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines

Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**No**
U.S.	**No**
European	**Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

No specific training

- **Training centres availability. Please comment on acute cardiac care training in your country.**

No additional comment

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologist;	PCI-centre; Coronary care unit
Hypothermia	Cardiologist Anaesthesiologist / Intensivist	Anaesthesiology department / Intensive care unite; Coronary care unit
Mechanical ventilation	Cardiologist Anaesthesiologist / Intensivist	Anaesthesiology department / Intensive care unit
Dialysis	Nephrologist	Dialysis unit
Endomyocardial biopsy	Cardiologist;	PCI-centre;
Percutaneous coronary angioplasty	Cardiologist;	PCI-centre;
ECMO/ECLS	Cardiologist;	PCI-centre;
Non invasive ventilation	Anaesthesiologist / Intensivist;	Anaesthesiology department / Intensive care unite; Coronary care unit
Insertion and monitoring of an arterial lines	Cardiologist Anaesthesiologist / Intensivist;	Anaesthesiology department / Intensive care unite; Coronary care unit
Insertion and monitoring of a central venous catheter	Cardiologist Anaesthesiologist / Intensivist;	Anaesthesiology department / Intensive care unite; Coronary care unit;
Insertion and monitoring of a pulmonary artery catheter	Cardiologist Anaesthesiologist / Intensivist;	PCI-centre; Anaesthesiology department / Intensive care unite;
Pericardiocentesis	Cardiologist; Cardiac surgeon;	PCI-centre; Cardiac surgery department;
Transvenous temporary pacing	Cardiologist	PCI-centre; Coronary care unit;
Echocardiography transesophagial	Cardiologist	PCI-centre; Coronary care unit;
Direct current cardioversion	Cardiologist	Anaesthesiology department / Intensive care unit; Coronary care unit;
Echocardiograhy transthoracic	Cardiologist	Coronary care unit; General hospital

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	3500	Cardiologist;	PCI-centre; Coronary care unit;
NSTEMI	7000	Cardiologist; Internist;	PCI-centre; General hospital
Sudden cardiac death		EMS staff	Anaesthesiology department / Intensive care unite;
Pericarditis non complicated		Cardiologist	PCI-centre; General hospital
Cardiogenic shock		Cardiologist;	PCI-centre; Anaesthesiology department / Intensive care unit;
Cardiac tamponade		Cardiac surgeon	Cardiac surgery department;
Type A aortic dissection		Cardiologist; Cardiac surgeon;	Coronary care unit; Cardiac surgery department;
Conduction disturbances with syncope		Cardiologist;	PCI-centre;
Pulmonary edema		; Cardiologist; Anaesthesiologist / Intensivist;	PCI-centre; Anaesthesiology department / Intensive care unit
Non-complicated type B dissection		Cardiologist; Anaesthesiologist / Intensivist;	PCI-centre; General hospital

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac diagnosis are not hospitalised in a unit with specific monitoring capabilities, but most are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

There are 6 PCI centres in the country. All of them equipped with CCU managed by cardiologists. In general hospitals, there are usually general intensive care units some of them managed by cardiologists.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of reimbursement,	1	X				
Lack of trained personnel	2		X			
Lack of referral	2		X			
Lack of centres	2		X			
Limited financial resources	2		X			
Lack of operators	3			X		
Low awareness of guidelines	3			X		

SPAIN

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
46593	17.5	21.0	77	33 763

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
30	23.7	19.0	8.6	477.1	130.4

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
1.7	11.0	8.9	14.0	22.8

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
381	50	26	75	76	515	10	19

*per 100 000 population

1. Name of National Cardiac Society

Spanish Society of Cardiology / Sociedad Española de Cardiología

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Ischemic Heart Disease and Cardiovascular Acute Care / Cardiopatía Isquémica y Cuidados Agudos Cardiovasculares

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

A STEMI network including urban and rural areas exists in around 70% of the country. However, there are No networks for other acute cardiac pathologies.

- **In hospitals**

There are important differences across the country in the management of acute cardiac patients. Globally, in non academic /non tertiary centre, acute cardiac patents are managed by intensivists. It is in academic /tertiary centre where the differences between areas are more pronounced. For example in Catalonia all acute cardiac patients are managed by Cardiologists and in Andalusia there is only one unit controlled by a Cardiologist.

4. How hospitals are reimbursed for acute cardiac care patients

Hospitals are not reimbursed for acute cardiac care patients

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physicians do not receive reimbursement or incentives

Hospitals

Hospitals do not receive reimbursement or incentives

- **Treatment availability for acute cardiac care**

Restricted to certain number of treatments/budget per year

5. National or large regional registries

***No**TE: please indicate registries even regional ones that might be of interest even if you do not have the full name. Good regional registries might allow for extrapolation to national or even European level.*

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		STEMI Codi IAM (Catalonia)
Acute heart failure		X	
Cardiac arrest		X	

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered to the management of acute cardiac patients

National Cardiac Society **No**
U.S. **No**
European **Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?
No
For allied professionals?
No
For training centres?
No

- **National Cardiac Society supporting ACCA certification system**

Yes, the Society advises ACCA certification, but it does not require it

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

Yes

- **Training centres availability. Please comment on acute cardiac care training in your country.**

There are some centres with capability of delivering acute cardiac training and research.
Cardiologists can obtain clinical competence and skills following the ACCA training program (fellow in acute cardiac care) in a Intensive Cardiac Care Unit with recognized capability in training Cardiologist.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	1. Cardiologist, 2. Intensivist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Hypothermia	1. Cardiologist, 2. Intensivist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Mechanical ventilation	1. Intensivist, 2. Cardiologist	1. General Mixed Medical/Surgical Unit 2. Acute Cardiac Care Unit
Dialysis	1. Intensivist, 2. Cardiologist	1. General Mixed Medical/Surgical Unit 2. Acute Cardiac Care Unit
Endomyocardial biopsy	Cardiologist	Acute Cardiac Care Unit
Percutaneous coronary angioplasty	Cardiologist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
ECMO/ECLS	Cardiologist, Intesivist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Non invasive ventilation	Cardiologist, Intensivist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Insertion and monitoring of an arterial lines	Cardiologist, Intensivist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Insertion and monitoring of a central venous catheter	Cardiologist, Intensivist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Insertion and monitoring of a pulmonary artery catheter	Cardiologist, Intensivist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Pericardiocentesis	Cardiologist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Transvenous temporary pacing	1. Cardiologist, 2. Intensivist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Echocardiography transesophagial	Cardiologist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Direct current cardioversion	1. Cardiologist, 2. Intensivist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit
Echocardiograhy transthoracic	Cardiologist	1. Acute Cardiac Care Unit 2. General Mixed Medical/Surgical Unit

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	NA	Cardiologist/Intensivist	Acute Cardiac Care Unit / General Mixed Medical/Surgical Unit
NSTEMI	NA	Cardiologist/Intensivist	Acute Cardiac Care Unit / General Mixed Medical/Surgical Unit
Sudden cardiac death	NA	Intensivist /Cardiologist	Acute Cardiac Care Unit / General Mixed Medical/Surgical Unit
Pericarditis non complicated	NA	Cardiologist	Cardiology ward
Cardiogenic shock	NA	Cardiologist/Intensivist	Acute Cardiac Care Unit / General Mixed Medical/Surgical Unit
Cardiac tamponade	NA	Cardiologist/Intensivist	Acute Cardiac Care Unit / General Mixed Medical/Surgical Unit
Type A aortic dissection	NA	Cardiologist/Intensivist	Acute Cardiac Care Unit / General Mixed Medical/Surgical Unit
Conduction	NA	Cardiologist/Intensivist	Acute Cardiac Care Unit /

disturbances with syncope			General Mixed Medical/Surgical Unit
Pulmonary edema	NA	Cardiologist/Intensivist	Acute Cardiac Care Unit / General Mixed Medical/Surgical Unit
Non-complicated type B dissection	NA	Cardiologist/Intensivist	Acute Cardiac Care Unit / General Mixed Medical/Surgical Unit

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** X Managed mostly by intensivists **Yes**	Common in country **Yes** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

No additional comment

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of reimbursement,	1	X				
Low awareness of guidelines	2		X			
Limited financial resources	3			X		
Lack of referral	3			X		
Lack of centres	4				X	
Lack of trained personnel	4				X	
Lack of operators	4				X	

SWEDEN

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
9600	19.0	20.0	85	45 144

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
24	20.5	19.4	9.7	507.7	173.7

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
…	16.5	9.7	15.0	16.3

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
401	47	34	64	91	…	10	…

*per 100 000 population

1. Name of National Cardiac Society

Swedish Society of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Working group for Coronary Heart Disease

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

Sweden has a national phone system (1177) which anyone can call for health advice. There is also a regional system (run by county councils) in case of the need for an ambulance – this service is provided by community (or privately owned) ambulances. Many are equipped with a nurse and in some cases also with a doctor. There are also helicopters connected to the large regional and university hospitals. All are connected and directed through a national emergency system with a common phone number (112), where people dial-in in case of emergency. Most ambulances are equipped with an electronic system and are able to transfer ECGs directly to the regional CCU for quicker decision-making and direction of STEMI/LBBB cases that should go directly to the cath lab for primary PCI instead of the Emergency Dept. Primary PCI is used in about 95% of the STEMI cases. Only a few rural areas and the island of Gotland have thrombolysis as first line therapy, due to long transportation times (>2 hours).

- **In hospitals**

We have around 70 hospitals in the country and all are organized in much the same way. All are financed. We have 7-8 University Hospitals with tertiary functions and several additional large regional hospitals. Overall, 27 hospitals have angiography/PCI facilities.

4. How hospitals are reimbursed for acute cardiac care patients

Most hospitals are reimbursed either by a yearly budget plan, revised annually, or by payment based on DRG. Pay-for performance (ie reaching high levels of Quality points) is also applied in some regions based on the national registry performances.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physicians do not receive reimbursement or incentives

Hospitals

Hospitals receive per patient reimbursement (ie DRG)

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the National guidelines ·

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		Riks-HIA/Swedeheart
Acute heart failure	X		Riks-Svikt
Cardiac arrest	X		Hjärtstoppsregistret
Secondary preventive registry	X		Swedeheart/SEPHIA

- **Availability of a national quality insurance system or complication registry**

Yes

We have several quality registries such as Swedeheart (which includes the SCAAR registry – angiography/PCI), Pacemaker registry, Riks-Svikt that all report complications of various procedures.

6. Guidelines

Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**Yes**
U.S.	**No**
European	**Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

Yes, but it´s not required for practice

There has been a debate in the country whether we should have ACC as a separate specialty. Quite a few specialists are in place.

For allied professionals?

Yes, but it´s not required for practice

For training centres?

No answer

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

No

Included in the more specific guidelines (ie heart disease etc).

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

No specific training

- **Training centres availability. Please comment on acute cardiac care training in your country.**

Not available nationally but in several hospitals around the country, due to a long debate in the country about whether this should be a specialty or not.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologists, Intensivists	Thoracic ICU, ICU or in some CCU (few)
Hypothermia	Cardiologists, Intensivists	ICU, Thoracic ICU
Mechanical ventilation	Intensivists (majority)	ICU, Thoracic ICU
Dialysis	Nephrologists,	Dialysis dept
Endomyocardial biopsy	Cardiologists	Cath Lab
Percutaneous coronary angioplasty	Cardiologists, Radiologists (few)	Cath Lab
ECMO/ECLS	Intensivists	ICU, Thoracic ICU
Non invasive ventilation	Cardiologists	CCU
Insertion and monitoring of an arterial lines	Intensivists	CCU, Thoracic ICU, ICU
Insertion and monitoring of a central venous catheter	Nurses	CCU
Insertion and monitoring of a pulmonary artery catheter	Intensivists	ICU
Pericardiocentesis	Interventionalists	Cath lab
Transvenous temporary pacing	Cardiologists, interventionalists	Cath lab
Echocardiography transesophagial	Cardiologists, clinical physiologist	Clinical Physiology
Direct current cardioversion	Cardiologists	CCU, other cardiac wards
Echocardiograhy transthoracic	Cardiologists	Cardiology wards

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	5600	Cardiologists	CCU
NSTEMI	13100	Cardiologists	CCU
Sudden cardiac death	10000 (1500 survives)	Cardiologists	Emergency ward, ICU, CCU
Pericarditis non complicated	NA	Cardiologists	CCU
Cardiogenic shock	NA	Cardiologists, surgeons	CCU, ICU
Cardiac tamponade	NA	Cardiologists	CCU, ICU
Type A aortic dissection	Unknown 800 die/year	Cardiologists, thoracic surgeons	Thoracic surgery ward, sometimes cardiology
Conduction disturbances with syncope	NA	Cardiologists	Cardiology ward
Pulmonary edema	NA	Internal Medicine	Internal Medicine
Non-complicated type B dissection	Unknown 800 die/year	Cardiologists, vascular surgeons	Cardiology, Vascular surgery wards

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **Yes** Mostly in academic hospitals **No**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **Yes** Mostly in academic hospitals **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **No**

11. Sites and units that manage patients who need acute cardiac care

There is considerable heterogeneity in the units that are responsible for managing acute cardiac care patients. Most patients will be managed initially by emergency physicians, Internal medicine specialists or cardiologists who will then direct where the patient goes for further management.

They may keep the patient in an ED based monitoring unit (level B or M), or may transfer the patient to an acute cardiac care unit (most of the time level B or M and rarely in some tertiary hospitals level I). These units are normally managed by cardiologists.

Most patients who require prolonged (invasive or non invasive) ventilation will be primarily managed by intensivists or emergency physician and by cardiologists as consultants.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of referral	1	X				
Low awareness of guidelines	1	X				
Lack of centres	2		X			
Lack of reimbursement,	3			X		
Limited financial resources	3			X		
Lack of operators	3			x		
Lack of trained personnel	4				X	

Currently, we have a huge lack of nurses, especially trained ones. Many have left emergency care due to unhappiness with high levels of stress and salaries that are not competitive.

SWITZERLAND

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
8078	16.9	21.1	74	56940

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
26	19.4	17.8	8.0	464.1	144.9

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
3.9	17.0	11.5	22.1	25.9

*per 100 000 population

Human resources for health services

Physician	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
405	39	33	…	70	1739	10	84

*per 100 000 population

1. Name of National Cardiac Society

Swiss Society Of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

-Swiss Working Group for Interventional Cardiology and Acute Coronary Syndrome (ptca.ch)
-Swiss Heart Failure Working Group (heartfailure.ch)
-Swiss Cardiac Surgery (swisscardiac.org)

3. How the Health Care System is organised to manage acute cardiac care

- **In the pre-hospital setting**

The call number to central emergency service is the same (144) throughout Switzerland, but the organization of the centre is structured at Cantonal level. For life-threatening emergencies (cardiac arrest, acute dyspnea, chest pain), central dispatches the nearest ambulance. In most cantons, the ambulance service is organised by communes/cities. Currently, paramedics have formal 3-year training in a district school (swissrescue.ch). In urban centers, the call center may also send one physician depending on algorithms. In remote areas (such as rural, highway, lakes, mountains), emergencies are handled by sending a medical helicopter. Several private companies (Rega, TCS, Air Glacier, Air Zermatt) share the market for medical air services.

- **In hospitals**

Mostly patients are taken to the nearest hospital, except those with STEMI or/and hemodynamic instability. For these patients the nearest STEMI network hospital is recommended as the primary choice with transfer to a tertiary care hospital with ICCU and/or cardiac surgery (15 centers with primary PCI capacities and 10 centers with emergency cardiac surgery) if required.

4. How hospitals are reimbursed for acute cardiac care patients

Hospitals are reimbursed 55% from private insurance companies and 45% from the state. Payments are restricted to specific listed services, with DRG methodology applied in a proportion of payments.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians

Physicians do not receive reimbursement or incentives

Hospitals

Hospitals receive per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		AMIS-Plus (amis-plus.ch)
Acute heart failure		X	**No** but numerous local initiatives
Cardiac arrest		X	**No** but numerous local initiatives

Percutaneous Coronary Interventions (and pLVAD)	X		Ptca.ch

- **Availability of a national quality insurance system or complication registry**

Yes

6. Guidelines adhered to the management of acute cardiac patients

Guidelines adhered to the management of acute cardiac patients

National Cardiac Society	**No**
U.S.	**No**
European	**Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No

For allied professionals?

No

For training centres?

No

- **National Cardiac Society supporting ACCA certification system**

Yes, the Society advises ACCA certification, but it does not require national certification

- **Official national competency guidelines for acute cardiac care organisation?**

No

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

No specific training

- **Training centres availability. Please comment on acute cardiac care training in your country.**

No

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Cardiologist/cardiac surgeon	I(C)CU
Hypothermia	Intensivist	I(C)CU
Mechanical ventilation	Intensivist/Anesthesiologist	I(C)CU
Dialysis	Nephrologist/Intensivist	I(C)CU/nephrology
Endomyocardial biopsy	Cardiologist	Cath lab
Percutaneous coronary angioplasty	Cardiologist	Cath lab
ECMO/ECLS	Cardiologist/cardiac surgeon/vascular surgeon/ Intensivist	I(C)CU
Non invasive ventilation	Cardiologist Emergency medicine physician Intensivist	I(C)CU /Emergency department
Insertion and monitoring of an arterial lines	Intensivist/Anesthesiologist/Cardiologist Emergency medicine physician	Where needed: I(C)CU, cath lab, etc.
Insertion and monitoring of a central venous catheter	Intensivist/Anesthesiologist/Cardiologist Emergency medicine physician	Where needed: I(C)CU, cath lab, etc.
Insertion and monitoring of a pulmonary artery catheter	Intensivist/Anesthesiologist/Cardiologist	I(C)CU
Pericardiocentesis	Cardiologist	Where needed: I(C)CU, cath lab, etc.
Transvenous temporary pacing	Cardiologist, Emergency medicine physician, Intensivist	Where needed: I(C)CU, cath lab, etc.
Echocardiography transesophagial	Cardiologist, Intensivist, Anesthesiologist	Where needed: I(C)CU, cath lab, etc.
Direct current cardioversion	Cardiologist, Intensivist, Emergency medicine physician, Anesthesiologist	Where needed: I(C)CU, cath lab, etc.
Echocardiograhy transthoracic	Cardiologist, Intensivist	Where needed: I(C)CU, cath lab, etc.

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	NA	Cardiologist (Intensivist)	ICCU in tertiary care and ICU in secondary care
NSTEMI	NA	Cardiologist (in nearest hospital intensivist or internal medicine physician)	ICCU or intermediate care ICU
Sudden cardiac death	NA	Cardiologist (in nearest hospital intensivist)	ICCU or in nearest hospital ICU, then transferred to ICCU
Pericarditis non complicated	NA	Cardiologist	Cardiology or internal medicine
Cardiogenic shock	NA	Cardiologist	ICCU
Cardiac tamponade	NA	Cardiologist	ICCU
Type A aortic dissection	NA	Cardiologist/cardiovascular surgeon)	ICCU
Conduction disturbances with syncope	NA	Cardiologist (in nearest hospital intensivist or internal medicine physician)	ICCU or in nearest hospital ICU, then transferred
Pulmonary edema	NA	Cardiologist (in nearest hospital intensivist or internal medicine physician)	ICCU or in nearest hospital ICU, then transferred
Non-complicated type B dissection	NA	Cardiologist/cardiovascular surgeon	ICCU or department of vascular/cardiac surgery

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis to their management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **Yes** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **No**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients **Yes** Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists	Common in country **No** Mostly in academic hospitals **No**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

ECMO/pVAD are available in most primary PCI centers. Surgical VAD and HTonly available in Lausanne/Geneva, Bern and Zurich. Patients that require sVAD and HTare secondarily referred to these tertiary centers.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	1	x				
Limited financial resources	1	x				
Lack of reimbursement,	2		x			
Lack of operators	2		x			
Lack of referral	3			x		
Lack of trained personnel	3			x		
Low awareness of guidelines	4				x	

sVAD are not reimbursed

UKRAINE

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
45246	15.2	15.2	69	8 665

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
30	20.1	29.0	14.6	1 087.4	667.1

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
5.2	22.5	7.8	12.2	42.8

*per 100 000 population

Human resources for health services

Physician*	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
350	61	…	39	135	717	10	33

*per 100 000 population

1. Name of National Cardiac Society

Ukrainian Association of Cardiology

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

Ukrainian Association on Acute Cardiac Care

3. How the Health Care System is organised tmanage acute cardiac care.

- **In the pre-hospital setting**

Pre-hospital cardiac care available through ambulance service. They have special algorithms created with national experts on acute cardiac care for acute settings. It includes reperfusion network and centres for STEMI patients.

- **In hospitals**

In-hospital management of Acute cardiac care patients is provided by coronary care units (big regional centres and university hospitals), Cardiology departments of regional hospitals (Intensive care wards), Emergency departments of municipal hospitals.

4. How hospitals are reimbursed for acute cardiac care patients

There is state support for Acute Cardiac Care in Ukraine and all state hospitals have the required facilities. Some private hospitals have foundations for emergency care.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

Physicians
Physicians do not receive reimbursement or incentive
Hospitals
Hospitals do not receive reimbursement or incentives

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the National guidelines ·

5. National or large regional registries

***No**TE: please indicate registries even regional ones that might be of interest even if you dnot have the full name. Good regional registries might allow for extrapolation tnational or even European level.*

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	X		ACS percutaneous procedures registry, ACS surveys (2009, 2015)
Acute coronary syndromes		x	
Acute heart failure		x	
Cardiac arrest		x	

- **Availability of a national quality insurance system or complication registry**

No

6. Guidelines adhered tthe management of acute cardiac patients

National Cardiac Society **Yes**
U.S. No

European **Yes**

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No

There is No special certification in ACC but doctors need certification for certain procedures (echo-, PCI, electrophysiology, methods for apheresis, dialysis etc).

For allied professionals?

No

In Ukraine (Academy of Postgraduate Medical Education) established special course for intensivists and anaesthesiologists for ACC. We have No national guidelines for acute cardiac care organization. Facilities for ACCU training are available in university hospitals and hospitals of the National Academy of Medical Sciencies, in the system of post-graduate medical education.

For training centres?

Yes, but it´s not required for practice

- **National Cardiac Society supporting ACCA certification system**
  No
- **Official national competency guidelines for acute cardiac care organisation?**
  No
- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**
  No specific training
- **Training centres availability. Please comment on acute cardiac care training in your country.**

There are some state training facilities (special courses with certification) if doctors involved in cardiac anaesthesiology and resuscitation, acute intensive care but not for acute cardiac care in cardiology.

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	1. Cardiac surgeon 2. Intensivist	Level I, ACCU
Hypothermia	1. Cardiac surgeon 2. Intensivists	Level I, ACCU
Mechanical ventilation	1. Cardiologist 2. Intersivists	Level M, I, CCU
Dialysis	1. Nephrologist 2. Intensivists	Level I, ICCU
Endomyocardial biopsy	1. Cardiac surgeon 2. Intensivists	Level I, ICCU
Percutaneous coronary angioplasty	1. Interventional cardiologists 2. Vascular surgeon	Level M, I, ACCU, ICCU
ECMO/ECLS	1. Intensivists 2. Surgeon	Level M, ICCU
Non invasive ventilation	1. Cardiologist 2. Intensivist	Level B, M, I
Insertion and monitoring of an arterial lines	1. Intensivists 2. Cardiologist	Level M,I, ACCU, ICCU
Insertion and monitoring of a central venous catheter	1. Cardilogist 2. Intensivists	Level B,M,I, ACCU
Insertion and monitoring of a pulmonary artery catheter	1. Intensivist 2. Cardiologist	Level M, I, ICCU
Pericardiocentesis	1. Cardiac surgeon 2. Intensivists	Level I, ACCU, ICCU
Transvenous temporary pacing	1. Cardiologist 2. Electrophysiologist	Level M, I, ACCU
Echocardiography transesophagial	1. Cardiologist 2. Ultrasound specialist	Level M, I, ACCU
Direct current cardioversion	1. Cardiologist 2. Intensivists	Level B, M, I
Echocardiograhy transthoracic	1. Cardiologist 2. Ultrasound specialist	Level M, I

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	~ 25000/y	1. Cardiologists	Level B, Level M
NSTEMI	~ 20000/y	1. Cardiologists	Level B, Level M
Sudden cardiac death	NA	1. Intensivists 2. Cardiologist	Level B, Level M
Pericarditis non complicated	NA	1. Cardiologists	Level B, Level M
Cardiogenic shock	NA	1. Cardiologists 2. Intensivists	Level M, Level I
Cardiac tamponade	NA	1. Cardiac surgeons 2. Cardiologists	Level M, Level I
Type A aortic dissection	NA	1. Cardiac surgeons 2. Cardiologists	Level I
Conduction disturbances with syncope	NA	1. Cardiologists 2. Electrophysiologists	Level B, Level M
Pulmonary edema	NA	1. Intensivists 2. Cardiologists	Level B, Level M, Level I
Non-complicated type B dissection	NA	1. Cardiologists 2. Intensivists	Level M, Level I

10. Units that manage patients who need acute cardiac care

Many patients with an acute cardiac care diagnosis are not hospitalised in a unit with specific monitoring capabilities. But many are. In this case, here are the units that participate on a reasonably frequent basis ttheir management.

	General Mixed Medical/Surgical unit	**General Medical unit**	**Dedicated Acute cardiac care** unit managed mainly by **non cardiologists**	**Dedicated Acute cardiac care** unit managed mainly by **cardiologists**
LEVEL B capabilities Monitoring: exclusively non-invasive. Diagnosis: echocardiography Treatment (non-medical): non-invasive ventilation might be possible.	Common in country **Yes** Manage acute cardiac care patients Managed mostly by intensivists **Yes**	Common in country **Yes** Manage acute cardiac care patients Managed mostly by intensivists **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**	Common in country **Yes** Mostly in academic hospitals **Yes**
LEVEL M capabilities # non-invasive and some invasive monitoring (central venous pressure, arterial lines) # echocardiography 24/7 # non-invasive ventilation	Common in country **No** Manage acute cardiac care patients Managed mostly by intensivists **Yes**	Common in country **No** Manage acute cardiac care patients Managed mostly by intensivists **Yes**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**
LEVEL I capabilities # Non-invasive and ALL invasive monitoring (PA catheter, central venous pressure, arterial lines…) # Echocardiography 24/7 # Mechanical ventilation, hypothermia initiation, continuous renal replacement possible.	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Manage acute cardiac care patients **No** Managed mostly by intensivists **No**	Common in country **No** Mostly in academic hospitals **Yes**	Common in country **No** Mostly in academic hospitals **Yes**

11. Sites and units that manage patients who need acute cardiac care

Most acute cardiac care patients in Ukraine are treated by regional Emergency departments with special wards or ACCU of university or regional hospitals (run by cardiologists). More intensive patients (eg suspicion of aortic dissection, cardiac arrest due to ventricular tachyarrhythmias, pulmonary embolism etc) can be treated at ICCU run by intensivists in collaboration with cardiac surgeons.

12. What are the main difficulties encountered by acute cardiac care in the country?

		Nobstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Lack of centres	3			X		
Lack of referral	3			X		
Low awareness of guidelines	3			X		
Lack of trained personnel	4				X	
Lack of operators	4				X	
Lack of reimbursement,	5					X
Limited financial resources	5					X

UNITED KINGDOM

Demographic and socioeconomic context

Population (1000)	Population Aged >65 (% of total population)	Life epectancy at 65 years	Urban (% of total population)	Real GDP, PPP$ per capita
63905	16.6	19.8	80	39 137

Health status and mortality indicators

Tobacco smoking*	Obesity**	Raised blood pressure***	Crude death rate per 1000	Age-standardized death rates****	Age-standardized death rates for circulatory diseases****
22	28.1	15.2	9.0	553.1	164.2

*Estimated age-standardized prevalence of tobacco smoking among people aged 15 years and over
**Estimated age-standardized prevalence of obesity (body mass inde ≥30 kg/m²)
***Raised blood Raised blood pressure (systolic blood pressure ≥ 140 or diastolic blood Pressure ≥ 90)
****per 100 000 population

Health services, health expenditure and health system coverage and utilization

Hospitals*	Inpatient care discharges*	Total Health ependiture as % of GDP	Government ependiture on health as % of total government ependiture	Private households' out-of-pocket ependiture as % of total health ependiture
…	13.3	9.1	16.2	9.3

*per 100 000 population

Human resources for health services

Physician*	Female (%)	Older than 55 years (%)	General practitioner*	Medical specialists*	Nurses	Physician Graduates*	Nurses Graduates*
278	47	13	80	67	820	13	42

*per 100 000 population

1. Name of National Cardiac Society

British Cardiovascular Society

2. Name of National Working Group on acute cardiac care or of the NCS body that is more related to it

The previous working group on Acute Cardiac Care was formed to produce recommendations on the future of Acute Cardiac Care which are available on the BCS Website and in Heart in abbreviated form (From coronary care unit to acute cardiac care unit– the evolving role of specialist cardiac care (Editorial) Heart 2012; 98:350-2)
There is No on-going ACC group.

3. How the Health Care System is organised to manage acute cardiac care.

- **In the pre-hospital setting**

There are STEMI networks across the UK involving both larger tertiary centres and smaller District General Hospitals. The ambulance service is aware of the nearest centre and brings all STEMIs directly to the appropriate hospital. Other cardiac emergencies (NSTEMI, heart failure, arrhythmias etc) may see a GP and be referred in to hospital, may call 999 and be brought in by ambulance, or may self present to an Accident and Emergency department.

- **In hospitals**

Most hospitals which accept acute medical patients have an Acute Cardiac Care Unit/CCU and usually additional cardiology beds or a cardiac ward. In the ideal situation the majority of cardiac patients are managed within this area, unless there are co-morbidities which make a care of the elderly (COE) bed more appropriate. In this latter case there should be provision for outreach into the COE beds, when appropriate eg Heart Failure Team ward rounds.

In reality this ideal situation is frequently not achieved due to extreme pressures on the system and the beds such that bed managers may have to send patients to any medical bed available. Generally patients at highest risk are admitted directly to the ACCU, but more moderate risk patients may have to wait as an in-patient for transfer to a cardiac bed for further investigation in busy periods. In addition, not all hospitals admitting cardiac patients have on-site cardiac catheterisation facilities and so patients may need transfer to a tertiary centre within their network for further investigation and treatment. There are guidelines for maximum waiting times for transfer in this situation and in some areas the organisation is very slick and patients do not have to wait long for transfer.

4. How hospitals are reimbursed for acute cardiac care patients

Local clinical commissioning groups (run by GPs) are in charge of the budget and are responsible for making contracts with local hospitals for all acute medical care including cardiology. The rate at which the hospital is reimbursed is set nationally according to diagnosis and complexity, determined via coding, although there is an uplift to fees in London to allow for higher overheads. The system is crude and some diagnoses are well paid whereas others may not cover costs. Co-morbidities such as age and frailty are not well accounted for, and long in-patients stays are not adequately reimbursed.

- **Reimbursement availability for physicians and hospitals for acute cardiac care patients**

<u>Physicians</u>

Physicians do not receive reimbursement or incentives

Hospitals

Hospitals receives per patient reimbursement

- **Treatment availability for acute cardiac care**

No restrictions, but the indications for treatment have to follow the National guidelines

5. National or large regional registries

Registries relevant to acute cardiac care	Yes	No	Name
Acute coronary syndromes	x		Myocardial Infarction National Audit Project (MINAP)
Acute heart failure	x		National Heart Failure Audit
Cardiac arrest	x		National Cardiac Arrest Audit (NCAA)
Angioplasty	x		British Cardiac Intervention Society Audit

- **Availability of a national quality insurance system or complication registry**
  No – but some areas have reimbursement incentives dependent on quality of outcomes

6. Guidelines adhered to the management of acute cardiac patients

NICE (note title change) **Yes**
U.S. **No** – unless none available in Europe which is rare now
European **Yes** – usually endorsed by our National Society

7. Education

- **Is there a national certification available for acute cardiac care?**

For physician?

No, There is No ACC qualification. All trainees are trained and gain experience in ACC and are expected to be able to run a mid level Acute cardiac care unit on qualification UNLESS they superspecialise in an area which takes them away from ACC eg ACHD

For allied professionals?

Yes, but it´s not required for practice. There are English Nursing Board Qualifications and courses but they are not essential if you can show appropriate experience. To gain a senior role further training is essential. To be in charge on an ACCU full training in resuscitation would also usually be expected

For training centres?

No

- **National Cardiac Society supporting ACCA certification system**

No

- **Official national competency guidelines for acute cardiac care organisation?**

No

Recommendations have been published and are available on the British Cardiovascular Societies web site. A brief editorial about the recommendations is also available in Heart. "Walker DM et al, From coronary care unit to acute cardiac care unit– the evolving role of specialist cardiac care (Editorial) Heart 2012; 98:350-2 "

- **Required or suggested period of training to manage acute cardiac patients with invasive monitoring and treatment techniques.**

No specific training - but cardiology training takes 5 years and includes this at all stages.

- **Training centres availability. Please comment on acute cardiac care training in your country.**

This is routinely taught as part of all training to achieve CST in Cardiology. There are No specific training centres in the UK. Some tertiary level units offer attachments to UK and foreign graduates with appropriate experience to gain exposure to some additional techniques eg LVAD, ECMO, etc which are not available everywhere

8. Specialists required for technical procedures in acute cardiac care

Selected procedures considered as representative of active management of acute cardiac care patients	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
IABP	Interventional Cardiologists	Inserted anywhere with access to cardiac catheter lab (tertiary and DGHs), usually managed on ACCU if not ventilated, ITU if ventilated
Hypothermia	Intensivist – but rarely used now as data not supportive. Managed normothermia more common	ITU
Mechanical ventilation	Intensivists (very rarely cardiologists in some specialist centres where consultant has dual accreditation)	All hospitals
Dialysis	Intensivists or renal unit	
Endomyocardial biopsy	Interventional Cardiologists (but usually in centres with a specialist interest)	Tertiary centres with interest
Percutaneous coronary angioplasty	Interventional Cardiologists	Tertiary centres and many DGHs
ECMO/ECLS	Limited number of intensivists	Highly specialised centres
Non invasive ventilation	Nurses on ACCU	Most ACCUs and also HDUs
Insertion and monitoring of an arterial lines	Cardiologist or intensivists (more common)	ITU>ACCU
Insertion and monitoring of a central venous catheter	Cardiologists and intensivists	ITU or ACCU
Insertion and monitoring of a pulmonary artery catheter	Cardiologists and intensivists (rarely used nowadays)	ITU
Pericardiocentesis	Interventional Cardiologists	All hospitals
Transvenous temporary pacing	Cardiologists	Most hospitals
Echocardiography transesophagial	Cardiologists – some anaesthetists in cardiac surgical centres	Most hospitals
Direct current cardioversion	Nurses, junior doctors	All hospitals
Echocardiograhy transthoracic	Technicians/physiologists/clinical scientists or cardiologists	All hospitals

9. Managements of some common pathologies in acute cardiac care

List of specialties and units that are intervening in acute cardiac patients' management in a country.

Selected pathologies considered as representative of acute cardiac care patients	Number per year if available	*Specialties that are intervening on a common basis. Priorities are indicated by numbers (first is most common)*	*Units where the patient with the intervention is most commonly managed (first is most common).*
STEMI non complicated	NA	Cardiologists	According to network arrangements – Tertiary Centre or DGH, ACCU
NSTEMI	NA	Cardiologists	Most hospitals, ACCU, may need referral elsewhere for angio if not available in smaller DGH
Sudden cardiac death	NA	Cardiologists	Most hospitals, ACCU
Pericarditis non complicated	NA	Cardiologists	Most hospitals, ACCU
Cardiogenic shock	NA	Cardiologists and intensivists	Most hospitals, ACCU or ITU
Cardiac tamponade	NA	Cardiologists	Most hospitals, ACCU
Type A aortic dissection	NA	Cardiothoracic surgeons	Diagnosis in DGH, then Tertiary centre for operation and initial post op care on ITU – may be sent back for final management to the referring centre
Conduction disturbances with syncope	NA	Cardiologists	Most hospitals, ACCU
Pulmonary edema	NA	Cardiologists	Most hospitals, ACCU
Non-complicated type B dissection	NA	Cardiologists	Most hospitals, ACCU

10. Units that manage patients who need acute cardiac care

The majority of patients with acute cardiac pathology are admitted to a District General Hospital, where they will be dealt with initially by emergency physicians and then transferred to the care of cardiologists, managed in ACCU or cardiac wards depending on severity of the condition. STEMI patients are directed to larger DGHs with cath lab facilities for Primary PCI or teriary centres, depending on the local network arrangements. Tertiary centres may have a cardiac intensive care unit, although these may largely be used for post cardiac surgical patients rather than acute cardiac care, depending on local arrangements.

11. Sites and units that manage patients who need acute cardiac care

All hospitals admitting unselected medical patients have cardiac care facilities. Some hospitals will No longer admit STEMI and so the cardiac care unit is used for arrhythmias, heart failure and NSTEMI only

.

12. What are the main difficulties encountered by acute cardiac care in the country?

		No obstacle	Some difficulties	Partial obstacle	Moderate obstacle	Severe obstacle
Low awareness of guidelines	1	x				
Lack of referral	1	x				
Lack of trained personnel	1	x				
Lack of reimbursement,	2		x			
Lack of centres	2		x			
Lack of operators	2		x			
Limited financial resources	5			x		

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